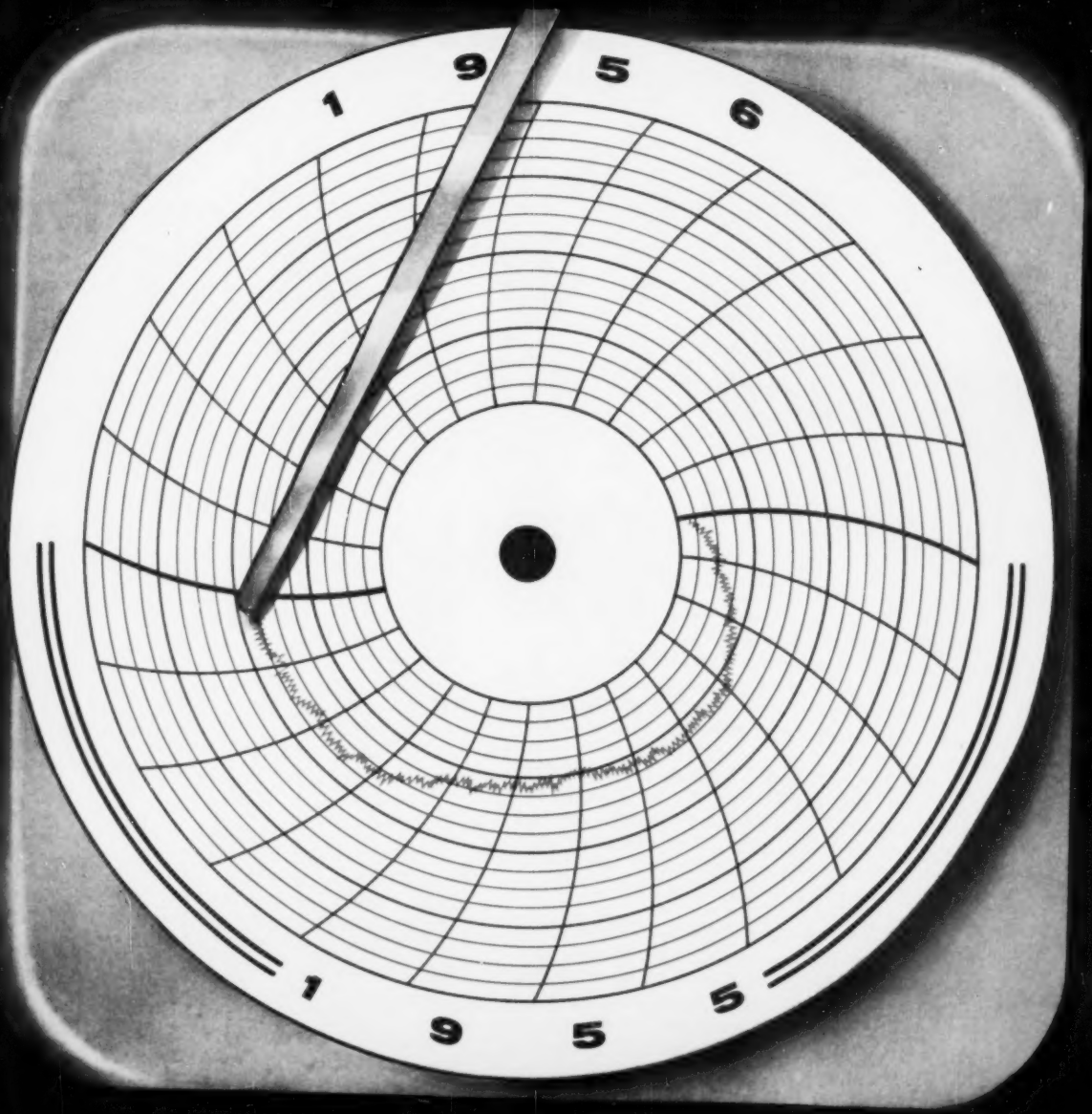
DECEMBER 26, 1955

# Electrical World

Price 35 Cents

A McGRAW-HILL PUBLICATION




## 1955 Year-End Review and Predictions for 1956

# This regulator *grows* with your system

Allis-Chalmers distribution regulators are equipped with the *Vari-Amp* feature. You get five current ratings from a single regulator. That can mean increases in current ratings of as much as 60% over the original rating.

Here's how it's done: Reduce the regulating range of a step regulator and you increase the current capacity. The *Vari-Amp* feature provides convenient stops that limit the range in five steps. As loads grow, just change the stop adjustment to reduce ranges to handle the additional current.

## Fits Varying Requirements

The *Vari-Amp* feature provides considerable flexibility. You can reduce ranges in 1¼% steps from ±10% down to ±5%. Range need not be equal in both directions. Set what you need — for example, 6¼% raise at 135% current, 10% lower at 100% current.

## No Extra Cost

Best of all, this convenient feature that gives you so many more uses for a voltage regulator comes at no extra cost. It gives you more for your regulation dollar because you get a lot more from a single regulator.

Get the complete story on the *Vari-Amp* feature. Call your nearby Allis-Chalmers office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-4802

*Originators of 5/8% Step Regulation*

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# Electrical World

Published for 81 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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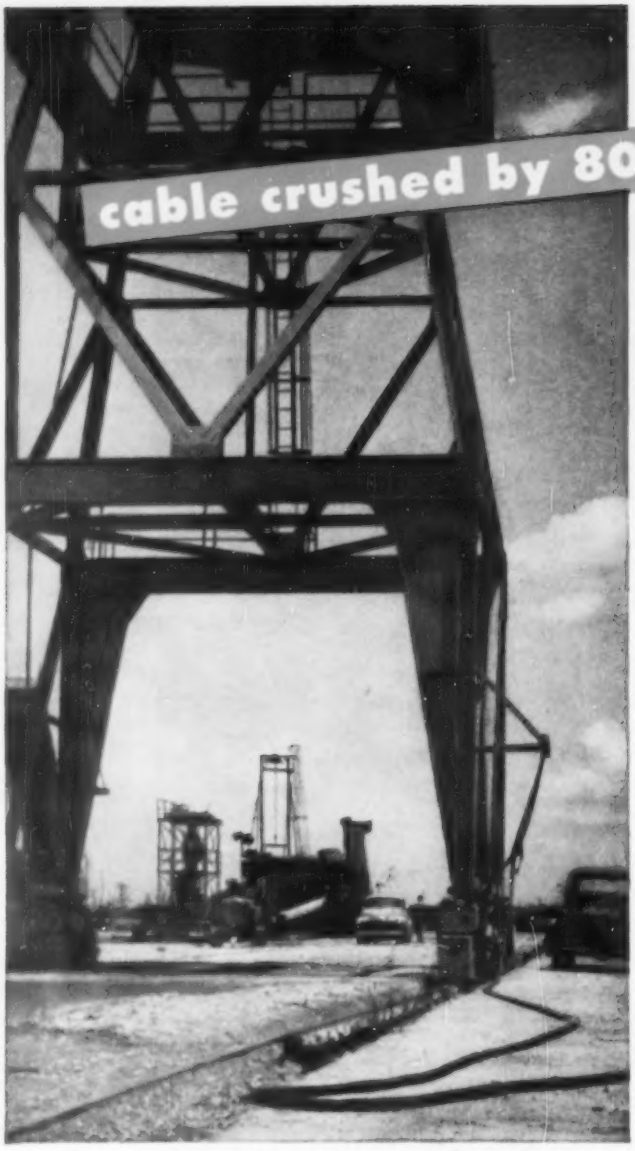


## cable crushed by 80-ton crane . . .

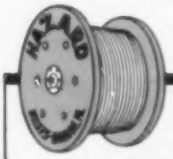
# but electrical service was uninterrupted

Shortly after the first length of Hazacord portable cable was installed on one of the gantry cranes operated by a large petroleum plant, the 80-ton crane ran over its cable, crushing and mangling it. Without interruption the cable continued to deliver the electrical power that kept the crane on the job. Removed for inspection, this length of Hazacord showed the insulation on each conductor was in place and complete although noticeably crushed and deformed.

Since that time, Hazacords have given more than two years of trouble-free service on this gantry crane and the others at this plant, although standard cables had previously lasted only a few months. This increased cable life, together with the graphic demonstration of Hazacord's toughness provided by the 80-ton runover have made Hazacord standard on many of the severest operations at this plant.

And this is only one of the accidents and unusual services that have proved Hazacord cables can withstand the roughest usage without failure and costly down-time of the equipment. If you have a problem involving portable cable, call or write your Hazard representative. Or contact Hazard Insulated Wire Works, Division of The Okonite Company, Passaic, N. J.

2710




HAZACORD

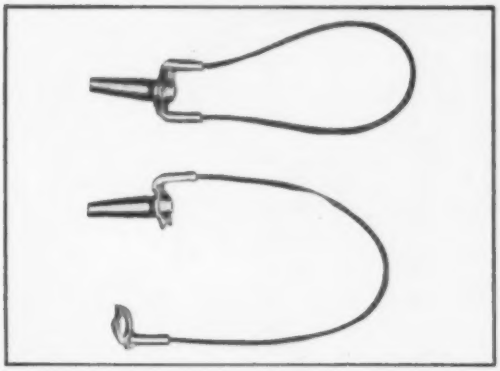
Mold-Cured

portable cables

PRODUCT OF OKONITE RESEARCH

# Electroline AUTOMATIC DEAD-END

## for Neutral Supported Multiple Conductor Service-Drop Cable



THE 4000 SERIES ANCHOR BRACKET

This Electroline Automatic Dead-End is designed for use with neutral-supported type of service drop. The insulation on the phase wires is not destroyed because these Dead-Ends grip only the bare neutral. This eliminates the possibility of shorting any phase. Available only for No. 6-AWG conductor. For automatic line Dead-Ends use the Electroline 3400 Series.

**THE ELECTROLINE 3800 SERIES** Automatic Dead-Ends lower construction costs because they are easily installed in a few seconds. This Dead-End is assembled as a one-piece unit with no loose parts to be dropped or lost. One end of the flexible bail is detachable for use with a spool-type insulator or other types of supporting anchorages now in service. This feature permits quick and easy installation with only one part, other than the conductor, to be handled by the lineman.

**ELECTROLINE 4000 ANCHOR BRACKET** — The 4000 Series Service Bracket, for use on permanently multi-grounded neutral systems (ideal for use with 3800 Series Dead-Ends as illustrated below), permits quick and simple insertion of a closed bail or loop—supports the cable at any angle. Installation costs are further reduced since this method of anchoring eliminates the insulator and insulator hardware.

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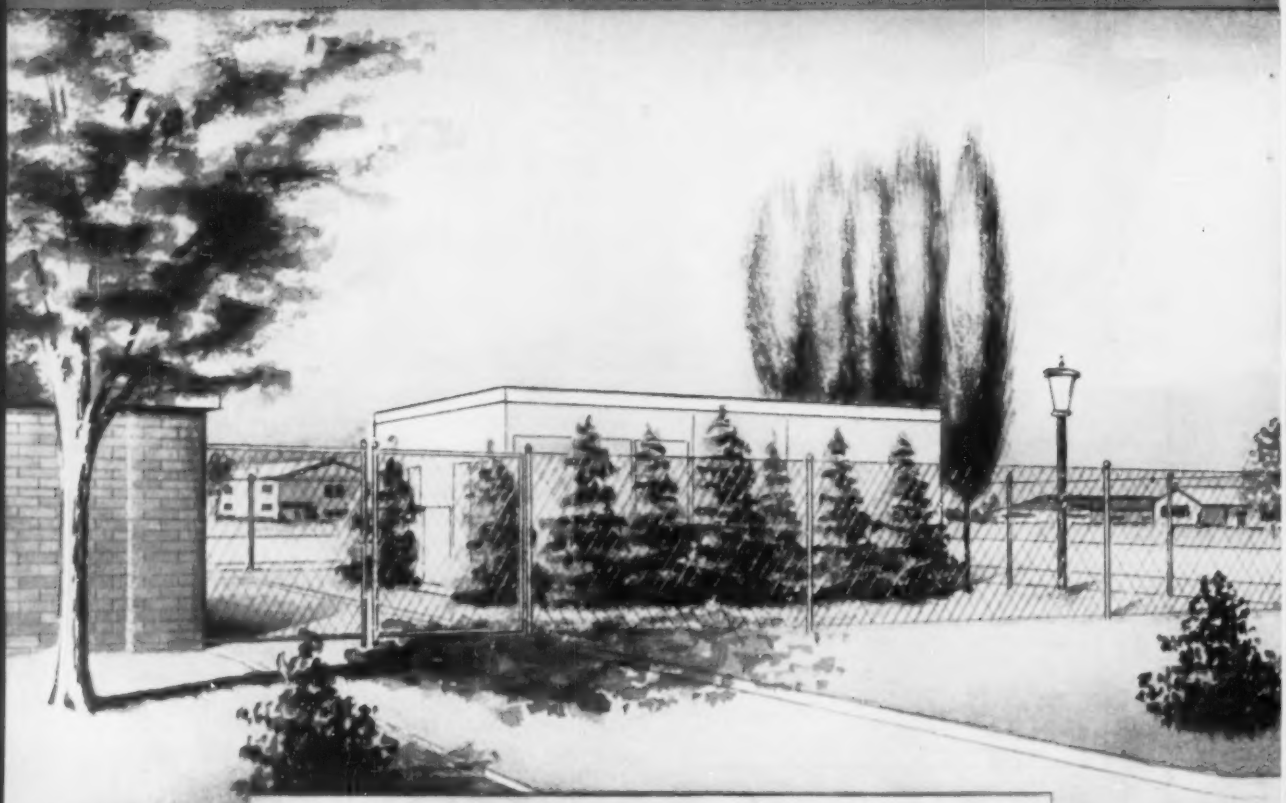
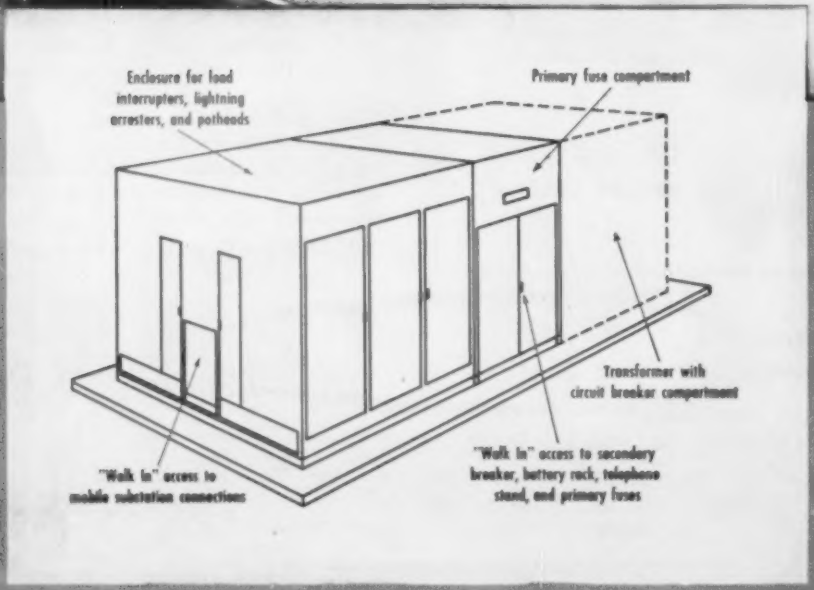
# WILL YOUR NEW DISTRIBUTION SUBSTATION




Enclosure for load interrupters, lightning arresters, and potheads
Primary fuse compartment
Transformer with circuit breaker compartment
"Walk in" access to secondary breaker, battery rack, telephone stand, and primary fuses
"Walk in" access to mobile substation connections

# HAVE Neighborhood Acceptance?

## WILL IT GIVE YOU ZONING BOARD APPROVAL?

**With S&C Metalclad Primary Gear you get a compact, attractive, and *Completely* Enclosed Substation for residential areas—even when the primary service is 34.5 kv**

## Plus THESE EXTRA ADVANTAGES

- Tamper-free metalclad construction: High voltage is locked in . . . intruders are kept out—and safe
- Simple, *packaged* installation that saves the time and cost of piecemeal open construction
- *Reliable protection* and ability to switch under all conditions, except short circuit
- New conveniences in operating and maintenance

Incorporated in the unit on the left are these operating features:

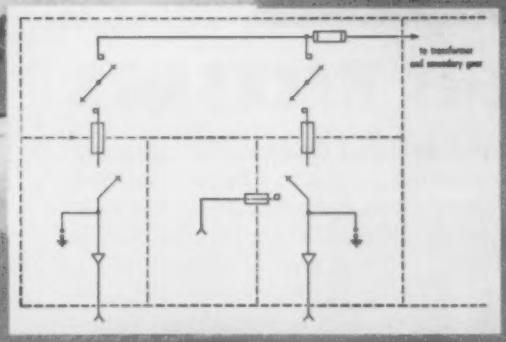
1) Pothead isolation—for protection of operators during maintenance

2) Disconnecting provisions to isolate load interrupters, to by-pass entire substation, and to feed mobile substation

3) Integral housing of control panels, battery rack, work stand, telephone stand. Elimination of need for unsightly tool shacks

4) Shelter for maintenance of secondary gear

5) Unit capsuled for shipment in one piece



Circuit diagram of the S & C Metalclad Primary Gear for the distribution substation illustrated. The gear is equipped with Type SM Power Fuses and Alduti Type Load Interrupters with provision for remote control operation.

**S&C ELECTRIC COMPANY**

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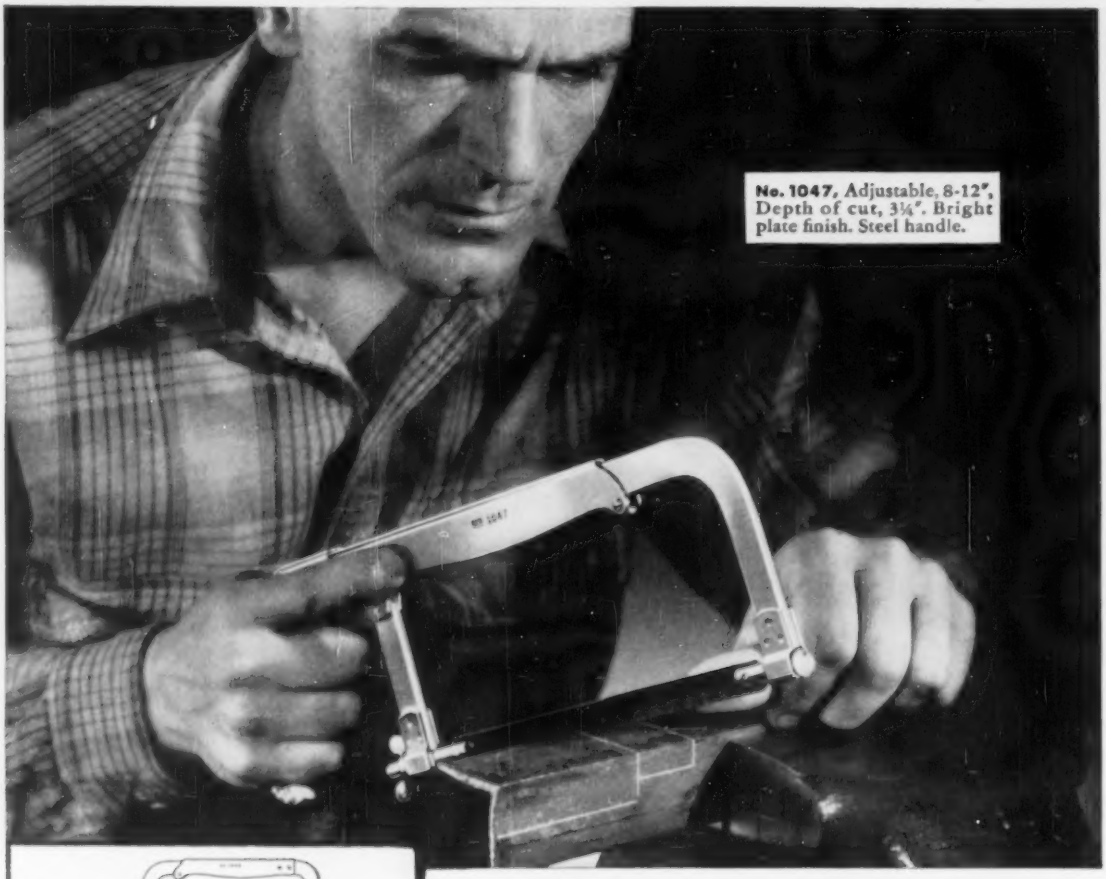

**No. 1047,** Adjustable, 8-12", Depth of cut, 3¼". Bright plate finish. Steel handle.

**No. 1042**

Adjustable, 8-12". Depth of cut, 2½". Bright plate finish. Wood handle.

**No. 1046**

Adjustable, 8-12". Depth of cut, 2½". Bright plate finish. Steel handle.

**No. 1049**

Adjustable, 8-12". Depth of cut, 3¼". Bright plate finish. Neoprene handle.

**No. 1044N**

Solid frame, 12". Depth of cut, 3¼". Bright plate finish. Neoprene handle. Also No. 1044 with steel handle.

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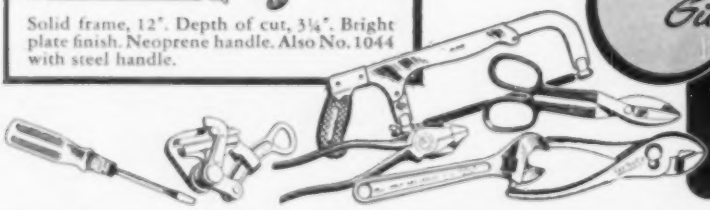

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**CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK**

# EXCLUSIVE! — Hookstick operated

# Automatic high speed grounding switch

- **Mounts low for easy accessibility**
- **Eliminates costly circuit breakers**

Southern States alone makes an Automatic High Speed Short Circuiting Switch that is opened and reset by a hookstick. It is the Type HR, a complete unit with spring power integrally contained. The Type HR can be mounted on most structures at a *low, accessible level* and is easily isolated for periodic testing. This switch is ideal to furnish low-cost protection that would otherwise require expensive circuit breaker installations. Check all the features and see why it will pay you to specify Southern States Type HR switches.

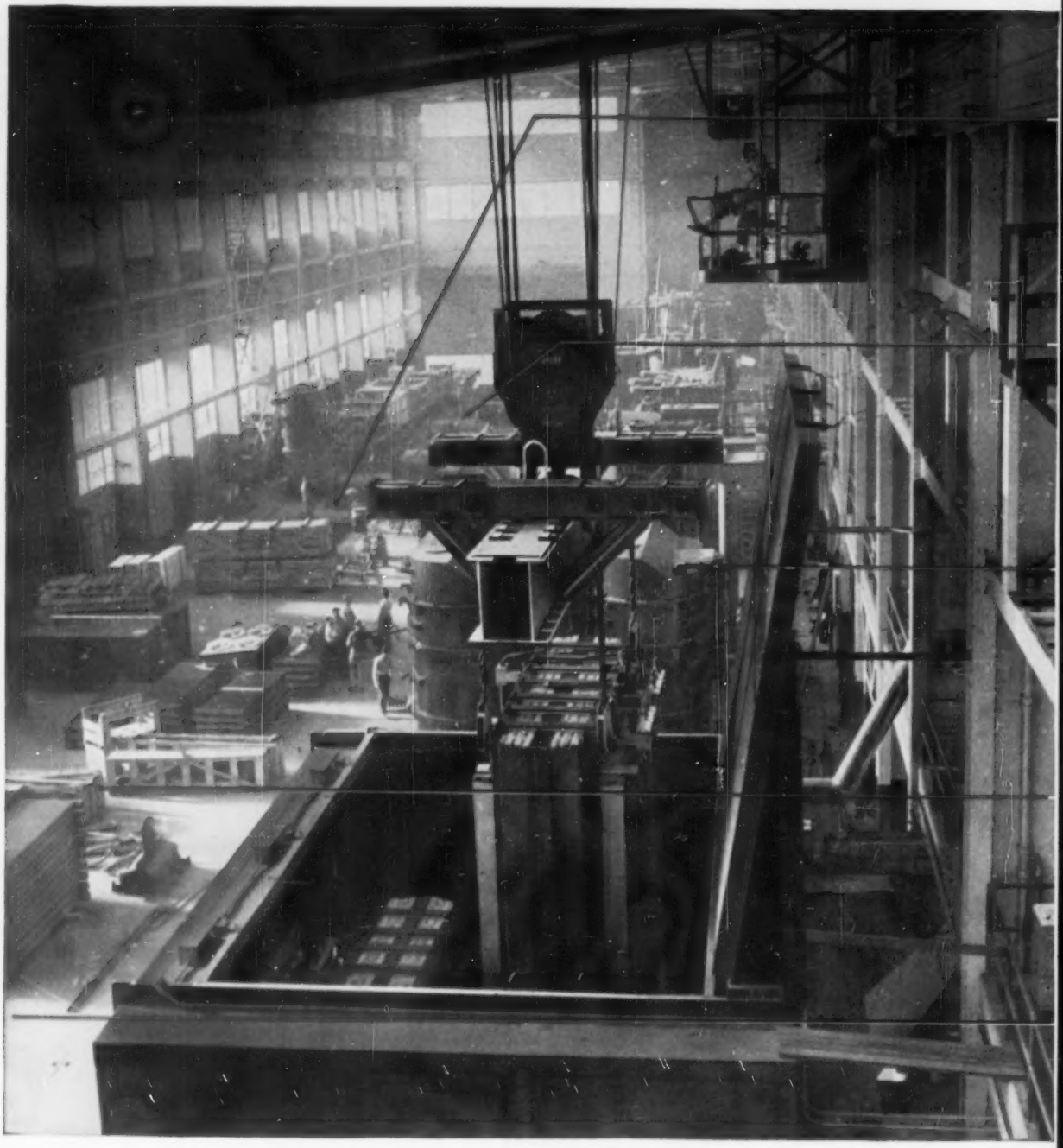
**THE TYPE HR**
Automatic High Speed Grounding Switch

- Simple and easy to install
- Guaranteed operating time within 30 cycles
- Available in voltage ratings from 34.5 kv to 161 kv
- Momentary rating of 20,000 amperes and four second rating of 12,600 amperes

ALSO AVAILABLE—Southern States Type HRS, an automatic high speed short circuiting switch, that is opened and reset by a system of conventional controls.

**SOUTHERN STATES EQUIPMENT CORP.**
HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto



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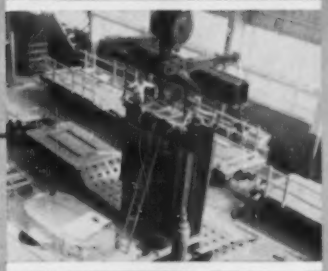

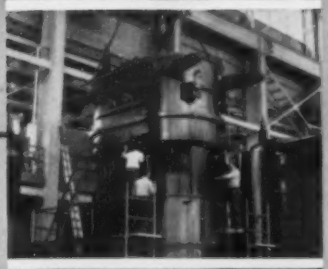

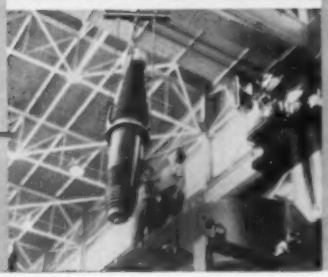

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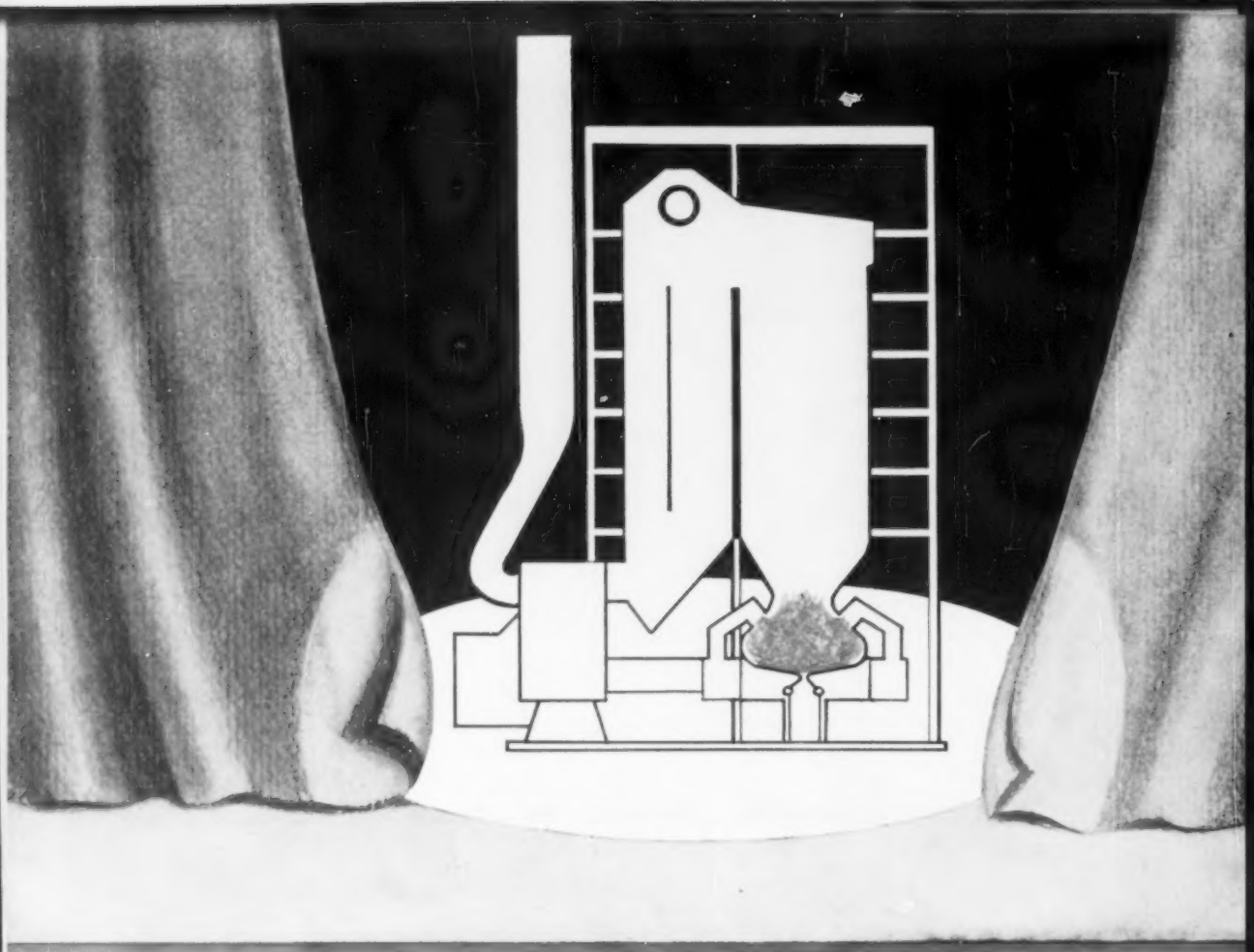

# Efficiently uses a wide range of coals . . . oil

*With these outstanding advantages:*

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# ...gas...lignite...delayed coke...fluid coke

*A survey of your plant by a consulting engineer could show ways of making surprising savings in your power costs.*

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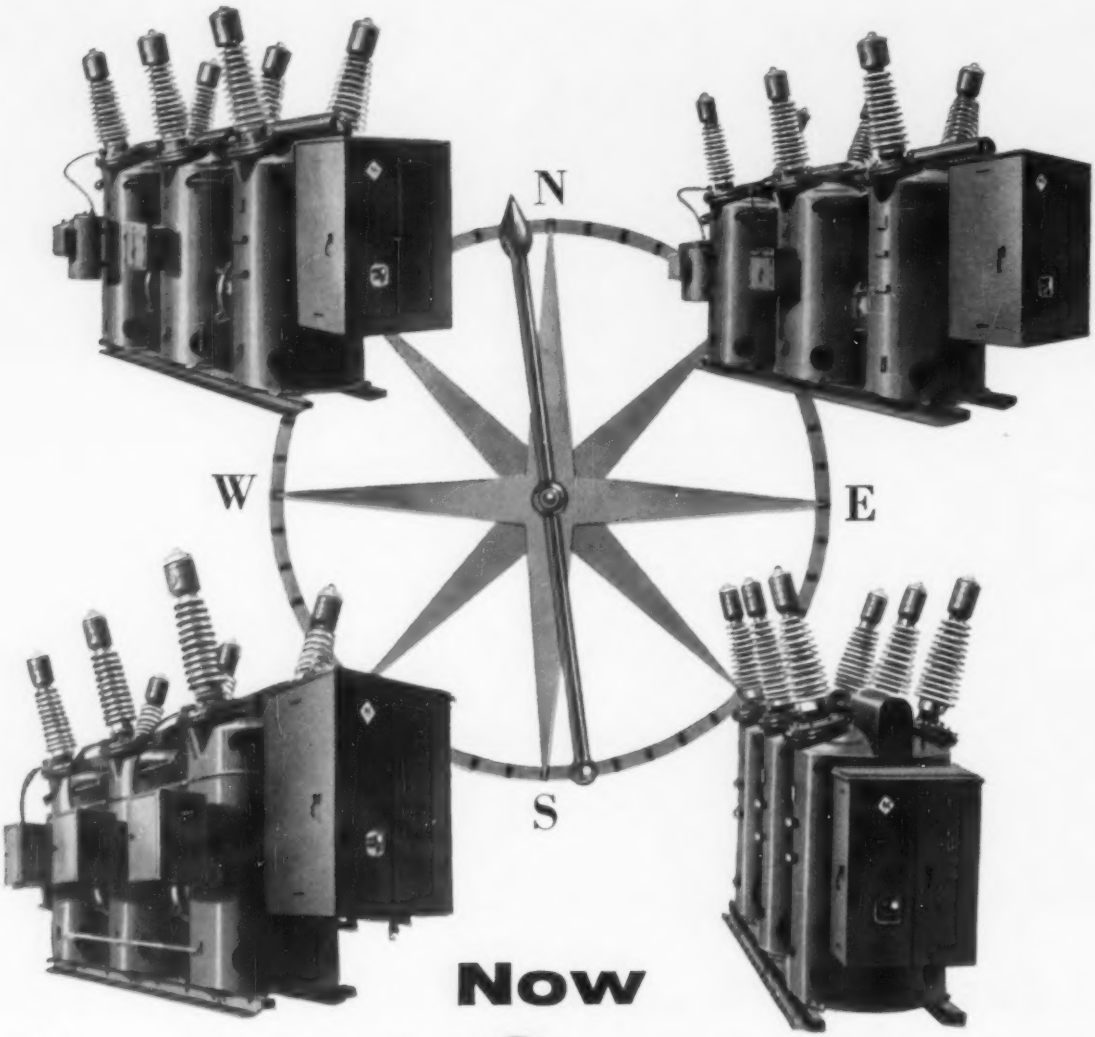


# Now *Pneu-Draulic* Operators used on 30 power systems

In the last six months, 15 more power systems have installed Allis-Chalmers hydraulically operated circuit breakers.

This is remarkable acceptance and it's due to several reasons. *Pneu-Draulic* operators are both simple and reliable . . . and they eliminate such common operating problems as moisture, condensation, dust and dirt.

Repeat orders are growing, too. This in itself is proof of the excellent performance of breakers with these operators under a wide range of field conditions.

Isn't it time you try an Allis-Chalmers breaker with *Pneu-Draulic* operator on your system?

Get information from your nearby A-C office or write for Bulletin 71B7942. Allis-Chalmers, Milwaukee 1, Wisconsin.

*Pneu-Draulic* is an Allis-Chalmers trademark.

**ALLIS-CHALMERS**

A-4784

***Through Mountainous Terrain, Dust Storms and Weather Extremes...***

From a point on Colorado's Cheyenne Mountain, the microwave beam is relayed over mountains and prairies alike in its 230-mile swing to gas fields in Kansas and Oklahoma.

# RCA Microwave's Dependability

## has justified Colorado Interstate Gas Co.'s choice for pipeline communications system

When Colorado Interstate engineers studied communication facilities to connect home office with pipeline compressor stations and with gas-producing fields in Kansas and Oklahoma, they considered wire line, common carrier and microwave. They chose RCA Microwave.

According to W. I. Blount, Superintendent of Dispatching and Communications, "RCA Microwave offered many advantages. It provided relatively easy maintenance, static-free operation and was economically equal to wire line or common carrier. And the more numerous the channels, the cheaper by comparison it became.

"In addition, such a microwave system made it possible to integrate into our already established VHF radio system more stations and mobile units and thus increase the efficiency and scope of our radio system. It offered almost unlimited future possibilities, such as telemetering channels, facsimile, teletype, additional voice channels, remote control of unattended stations and a service channel—all at a relatively small cost."

Only RCA MICROWAVE systems provide so many advanced engineering features. For example, single sideband suppressed-carrier frequency-division multiplex is used exclusively to meet high standards of dependability. Frequency is controlled from the terminal through the entire system.

*Microwave specialists will be glad to answer any questions and plan your installation. Mail coupon for further particulars on use of Microwave in utilities, pipelines, turnpike and other applications.*

**RCA MICROWAVE**

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# ELECTRIC POWER

## DELCO-REMY A.C. GENERATORS FOR EXTRA-HEAVY ELECTRICAL LOADS

Delco-Remy's new 6- and 12-volt A.C.-D.C. charging systems are the answer to the *extra-heavy* electrical demands of late-model municipal or public utility trucks, cars, and other vehicles equipped with two-way radio, floodlights, or other special electrical units. High wattage output is ample for heaviest electrical loads . . . generators pick up discharged batteries quickly in emergencies. Delco-Remy A.C.-D.C. charging systems are unexcelled at curb-idle . . . furnish up to 180 amperes at higher engine speeds . . . are dependable under the most rugged operating conditions at all engine speeds.

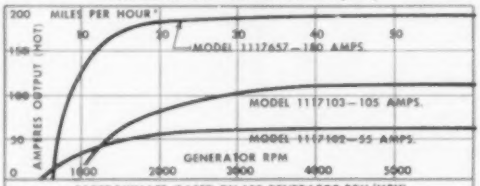
Application packages for both 6- and 12-volt generators, complete with installation instruction sheets for popular makes of cars and trucks, are available. Conversion is simple. See your nearest United Motors distributor for additional data.

**A.C. GENERATOR PERFORMANCE DATA (HOT)**

| Model | Volts | Cut-In RPM | Curb Idle Amperes* | Maximum Amperes | Power Watts SAE | Recommended For |
|---|---|---|---|---|---|---|
| 1117102 | 12 | 525 | 39 | 55 | 825 | All speeds. |
| 1117103 | 12 | 960 | 5 | 105 | 1575 | All speeds. |
| 1117657 | 12 | 550 | 130 | 180 | 2700 | All speeds. |
| 1117062-3-6 | 6 | 750 | 38 | 90 | 730 | All speeds. |

*APPROXIMATE (BASED ON 1000 GENERATOR RPM)

**A.C. GENERATOR OUTPUT CURVES (HOT)**




*APPROXIMATE (BASED ON 100 GENERATOR RPM/MPH)

## DELCO-REMY D.C. GENERATORS FOR MEDIUM-TO-HEAVY ELECTRICAL LOADS

Delco-Remy's 6- and 12-volt extra-output D.C. generators are an economical answer to the electrical needs of late-model municipal or public utility trucks, cars . . . other vehicles with additional lights, two-way radios, or other special electrical equipment in medium- to heavy-duty service in suburban areas. Delco-Remy extra-output D.C. generators are low in cost, simple to install, economical to maintain. Performance data on Delco-Remy extra-output D.C. generators are shown at the right.

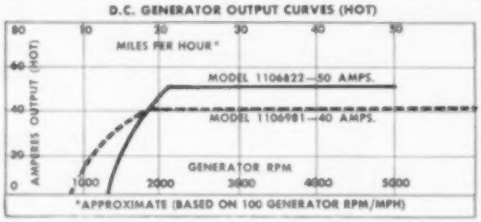
For further details and application data, see your nearest United Motors distributor.

**D.C. GENERATOR PERFORMANCE DATA (HOT)**

| Model | Volts | Cut-In RPM | Curb Idle Amperes* | Maximum Amperes | Power Watts SAE | Recommended For |
|---|---|---|---|---|---|---|
| 1106822 | 12 | 1300 | 0 | 50 | 750 | Low to Medium Speeds |
| 1106981 | 12 | 825 | 14 | 40 | 600 | Low speeds & idling. |
| 1106757 | 6 | 820 | † | 55 | 440 | Medium to high speeds. |
| 1106758 | 6 | 560 | 26 | 43 | 360 | Medium Speeds and Idling |
| 1106977 | 6 | 610 | 28 | 55 | 440 | Low speeds & idling. |

*APPROXIMATE (BASED ON 1000 GENERATOR RPM)

**D.C. GENERATOR OUTPUT CURVES (HOT)**

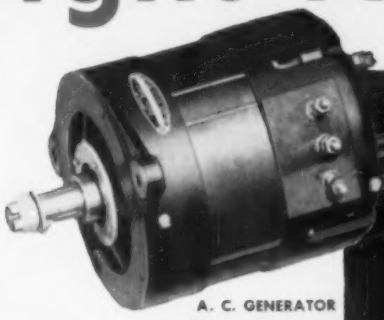



*APPROXIMATE (BASED ON 100 GENERATOR RPM/MPH)

Delco-Remy
ELECTRICAL SYSTEMS

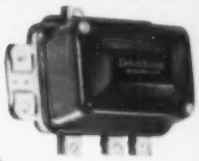
DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

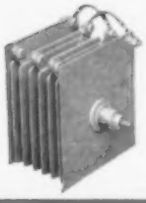
# right for the job



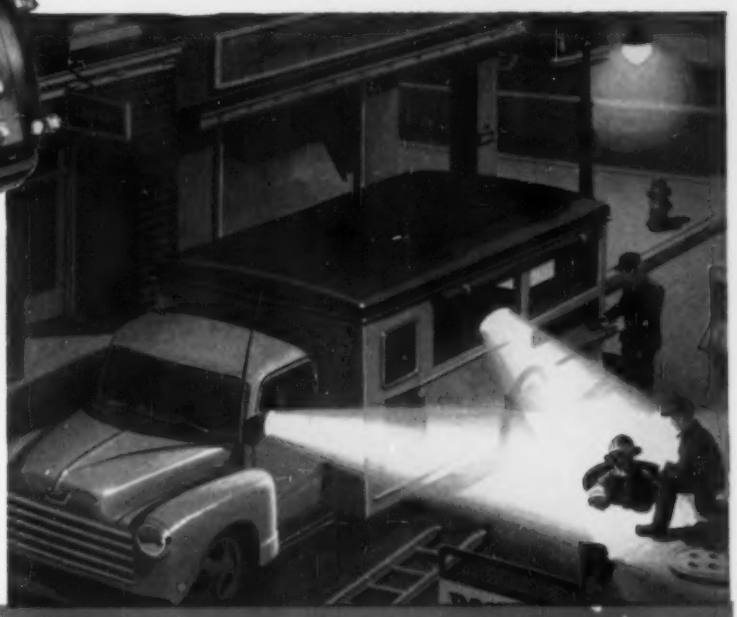
A. C. GENERATOR

REGULATOR

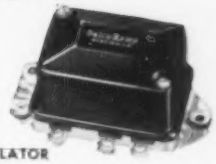




RECTIFIER



D. C. GENERATOR



REGULATOR

A GENERAL MOTORS PRODUCT GM A UNITED MOTORS LINE

DISTRIBUTED BY WHOLESALERS EVERYWHERE

"DESIGN OF PIPING SYSTEMS"

*(Second Edition)*

CONTENTS

- Strength and Failure of Materials
- Design Assumptions, Stress Evaluation, and Design Limits
- Local Components
- Simplified Methods of Flexibility Analysis
- Flexibility Analysis by the General Analytical Method
- Flexibility Analysis by Model Test
- Approaches for Reducing Expansion Effects: Expansion Joints
- Supporting, Restraining, and Bracing the Piping System
- Vibration: Prevention and Control
- History and Derivation of Piping Flexibility Analysis
- Derivation of Acoustic Vibration Formulas
- Charts and Tables

AS POWER PIPING BECOMES MORE CRITICAL

# M. W. KELLOGG'S DESIGN EXPERIENCE KEEPS PACE

As temperatures and pressures increase in steam-electric power plants, the problems involved in designing, engineering, and fabricating main and reheat steam piping multiply themselves many times over. This emphasizes, more than ever, the value of the long experience, in the laboratory and on the job, of The M. W. Kellogg Company—leader in the power piping field.

More evidence of M. W. Kellogg's accumulated piping design experience and ability to tackle each new power piping project in its stride, is the company's new 400-page book, "Design of Piping Systems"—to be published shortly by John Wiley & Sons. The most comprehensive work ever made available publicly on the physical design of piping, it is one of the many ways M. W. Kellogg cooperates with consulting engineers, engineers of power generating companies, and manufacturers of boilers, turbines, and allied equipment. An outline of contents is shown above.

**FABRICATED PRODUCTS DIVISION**

**THE M. W. KELLOGG COMPANY, 225 BROADWAY, NEW YORK 7, N. Y.**

*The Canadian Kellogg Company, Ltd., Toronto • Kellogg International Corporation, London*

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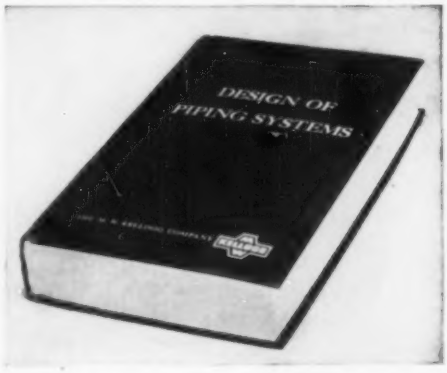


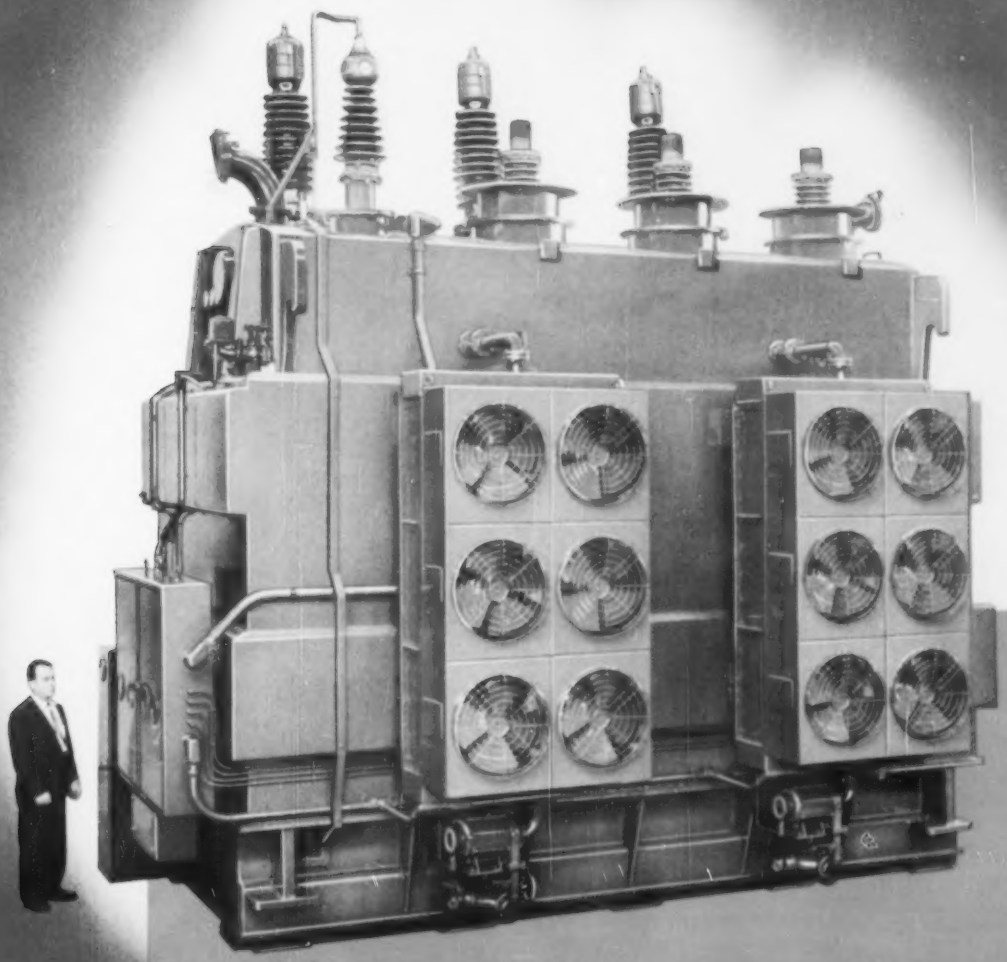

You can be sure of getting your copy of this limited edition of "Design of Piping Systems" by writing now to M. W. Kellogg, asking to be notified as soon as the book is available. Ask also for the new, free, 12-page booklet, "Piping Flexibility Analysis," which shows how M. W. Kellogg's various flexibility analyses techniques can cut piping design and construction costs.

POWER PIPING—THE VITAL LINK

# 175,000 Kva

## Three Phase CONTOUR DESIGN

# Pennsylvania Power Transformer



**Here is a main step-up generating station transformer supplied by Pennsylvania to a large Southern utility. It steps up a generated voltage of 17,500 volts to a transmission voltage of 115,500 volts. The small physical size of this large-capacity transformer is due to Pennsylvania's compact, shell form Contour Design, which enabled Pennsylvania to ship the transformer in an upright position, completely assembled except for bushings and coolers. Four Seal-Master pumps — exclusive with Pennsylvania — circulate the 8000 gallons of oil through two banks of heat exchangers. Overall height of the transformer is only twenty feet.**

**PENNSYLVANIA TRANSFORMER COMPANY**

*A McGraw Electric Company Division*

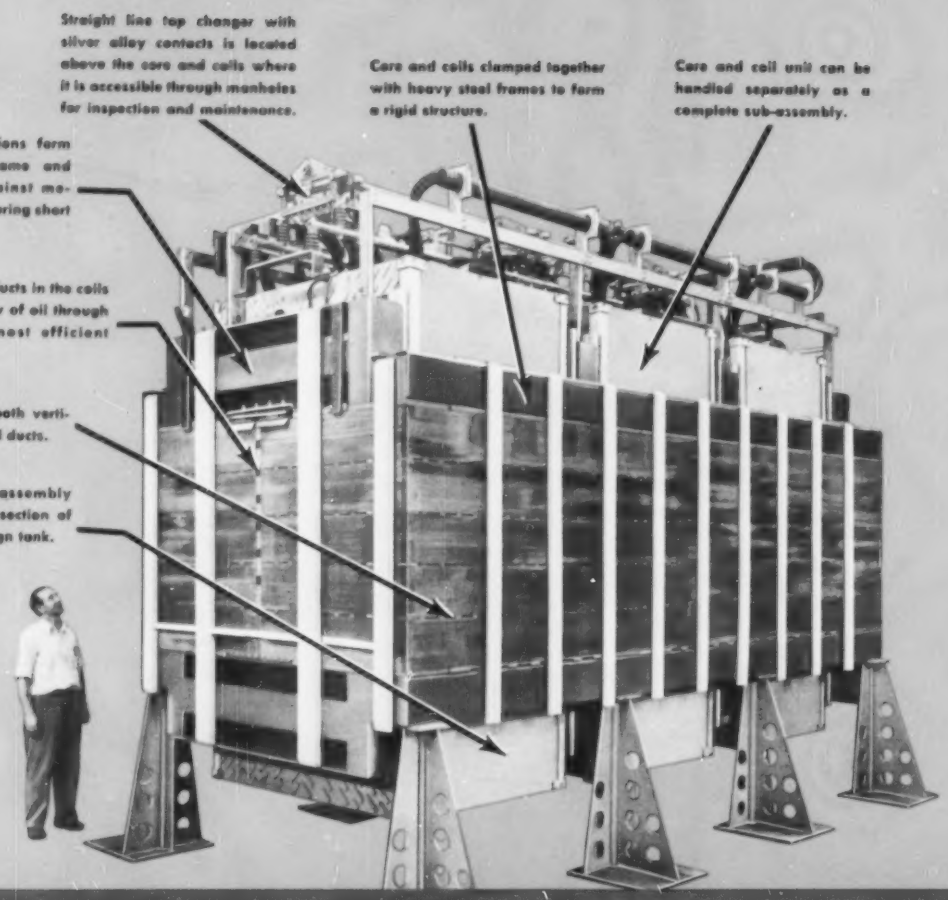
**CANONSBURG, PENNSYLVANIA** • ***Greater Pittsburgh District***

• • • • • SEE NEXT PAGE FOR INSIDE STORY • • • • •

# Inside a

# 175,000 Kva THREE PHASE contour design

# Pennsylvania Power Transformer


Straight line tap changer with silver alloy contacts is located above the core and coils where it is accessible through manholes for inspection and maintenance.
Core and coils clamped together with heavy steel frames to form a rigid structure.
Core and coil unit can be handled separately as a complete sub-assembly.
Heavy box sections form part of core frame and clamp coils against mechanical forces during short circuits.
Vertical cooling ducts in the coils permit a free flow of oil through the coils for most efficient cooling.
Core cooled by both vertical and horizontal ducts.
Core and coil assembly rests on bottom section of the Contour Design tank.

175,000 Kva, 3 Phase, 60 Cycles, 55 °C. Temperature Rise.
Forced-oil, forced-air-cooled. High voltage: 115,500 Grd. Y volts.
Low voltage: 17,500Δ volts.

**PENNSYLVANIA TRANSFORMER COMPANY**

*A McGraw Electric Company Division*

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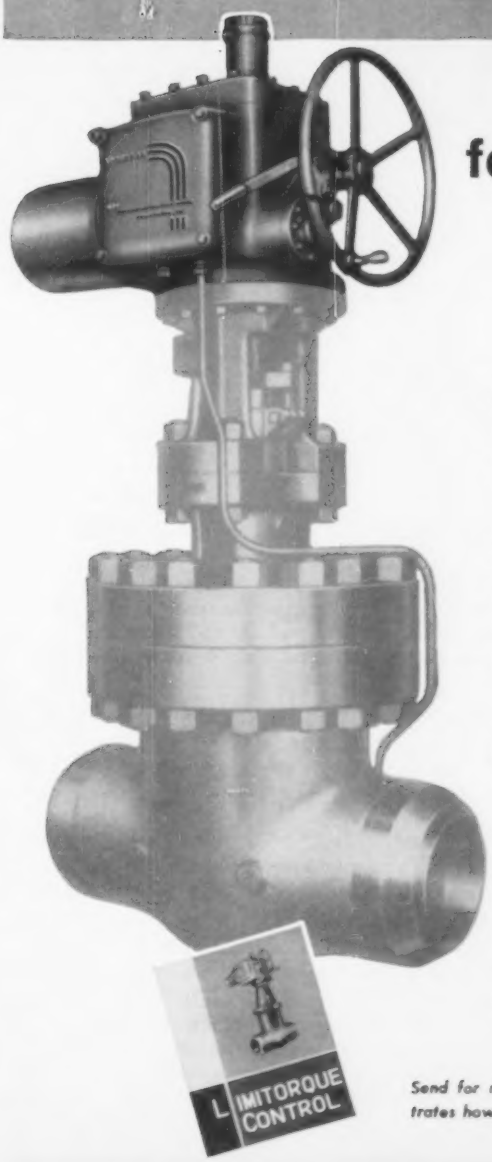
• • • • • *For exterior view of this transformer, see other side.* • • • • •

# YOU CAN ALWAYS COUNT ON

## Limitorque®

## for Push-Button Operation of VALVES




LimiTorque operates at the mere push of a button—saving time, labor, and money—over manual operation of valves at distant or inaccessible locations. LimiTorque opens and closes valves at the exact speed required, and "limits the torque" applied to valve operating parts, thereby preventing possible damage to valve stems, seats and discs. For safety, the handwheel "cannot rotate" when the valve is being motor operated.

LimiTorque may be actuated by any available power source—Electricity, Steam, Oil, Gas, Water or Air—and is now available for Microwave control.

You take no chances with LimiTorque, because these units have been time-tried and tested under the most severe operating conditions for more than 15 years. LimiTorque meets the demands of modern industry for the very best in Automatic Valve Operation.

*Send for new Catalog L-550, which describes and illustrates how and where LimiTorque is used on land and sea.*

**PHILADELPHIA GEAR WORKS, INC.**

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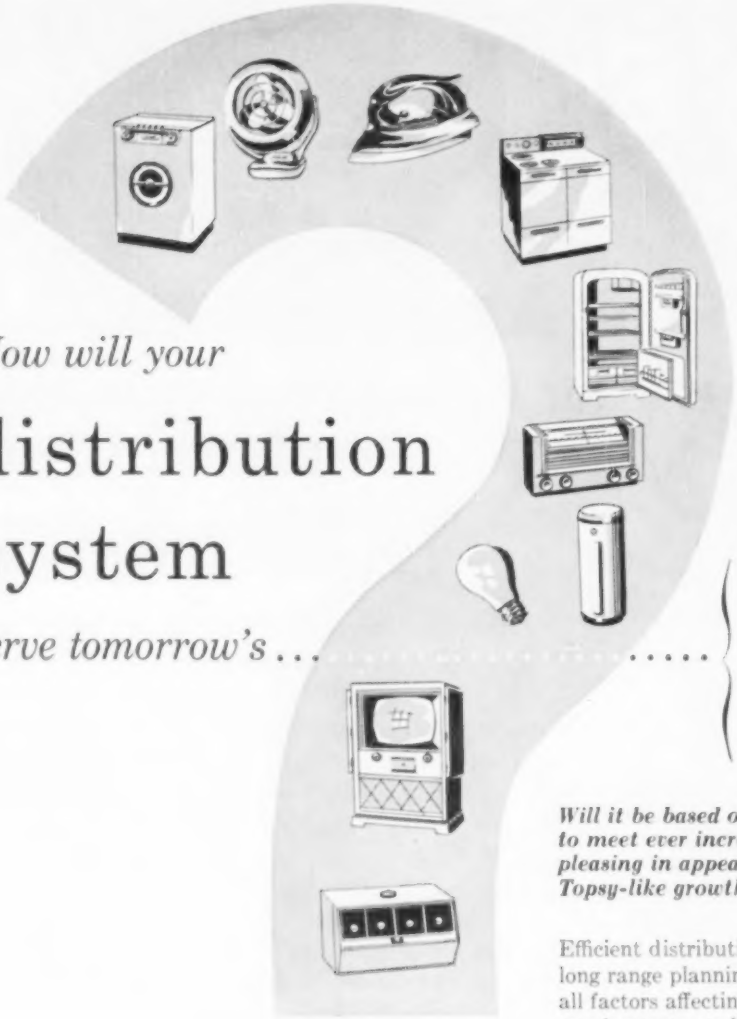
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.
BALTIMORE • CLEVELAND
LimiTorque Corporation-Phila.

Industrial Gears & Speed Reducers

LimiTorque Valve Controls
Established 1902



*How will your*

# distribution system

*serve tomorrow's . . .* . . . . . Loads? Customers? Needs?

***Will it be based on sound planning, ready to meet ever increasing demands? Will it be pleasing in appearance? Or will it reflect Topsy-like growth and soon become obsolete?***

Efficient distribution systems are achieved by long range planning and design . . . considering all factors affecting load growth, service requirements, and construction and maintenance practices.

In helping you modernize your distribution system for future demands (whether it's urban, suburban or rural), Ebasco draws upon 50 years of experience throughout the United States and abroad. Let this experience—and the objective viewpoint behind it—combine to assure you of low investment and operating costs.

1905 *Fiftieth Anniversary* 1955

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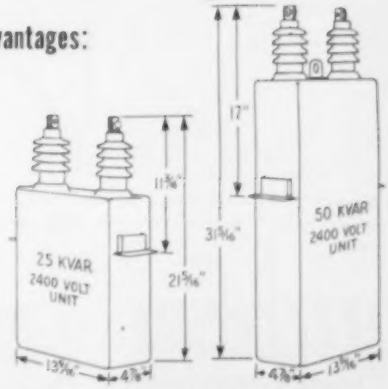
# Twice the capacity in the same area . . .

# Here is L-M's **New 50 kvar** Capacitor

**Line Material's new 50 kvar Elemex® capacitor offers these outstanding advantages:**

1. **Fits in existing NEMA standard hangers and L-M single-row racks.** Unit has same width, same thickness as 25 kvar capacitor. Ten inches of additional height give you twice the capacity.
2. **Weighs less per kvar.** A 50 kvar, 2400 volt unit weighs 106 pounds compared to 68 pounds for a 25 kvar unit. Thus a pole-mounted rack of nine capacitors increases weight only 30% and doubles the capacity.
3. **Incorporates outstanding product features of L-M's present 25 kvar unit**—including aluminum metallic coating under alkyd resin paint, "Paragroove" clamp-type connectors, strong solder-sealed bushings, and low-temperature Elemex liquid dielectric.

L-M now offers a line of more compact factory-assembled pole mounted racks in all voltage ratings from 2400 to 7960/13,800 volts, multi-grounded Y.




**Only 10 inches of additional height gives twice the capacity**

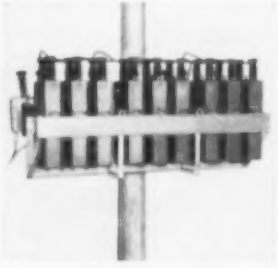
Ask the L-M Field Engineer for information on features, design, and delivery on the new 50 kvar capacitor and capacitor equipments. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

242R

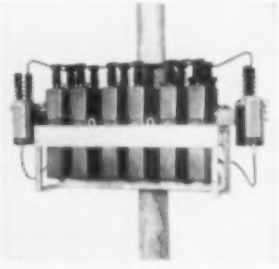
**LINE MATERIAL**

*Elemex® Capacitors*

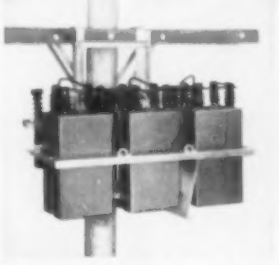
L-M's new 50 kvar capacitors are now available in 600 kvar switched capacitor racks. Assembly weighs only 43% more than a 300 kvar rack. Capacitor unit has same width, same thickness as a 25 kvar capacitor and will fit into existing NEMA standard hangers and L-M single-row racks.



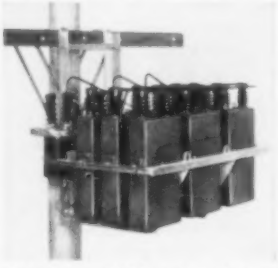
450 kvar single-row switched capacitor rack with L-M's Elemex 50 kvar capacitors. Weighs only 12% more than a 300 kvar single-row rack with 25 kvar capacitors.



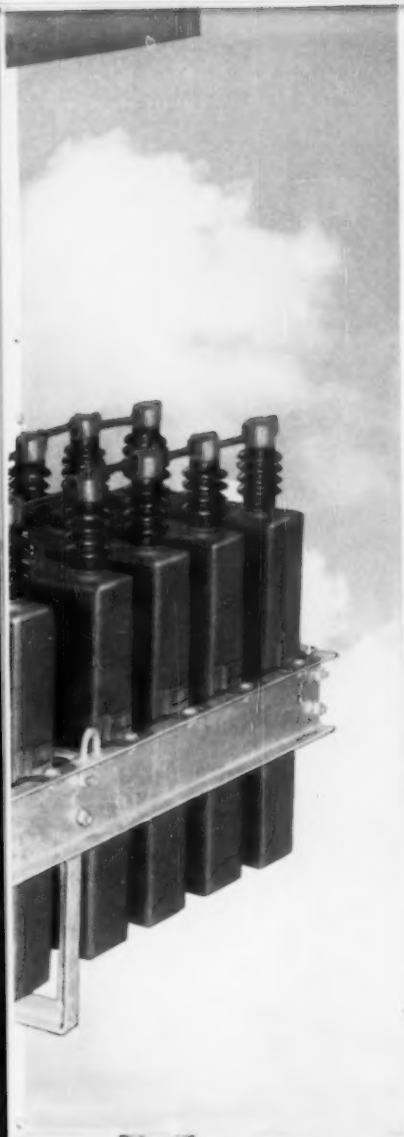
300 kvar single-row switched capacitor rack with L-M's Elemex 50 kvar capacitors. Assembly is quick and easy to install, inspect, and maintain.

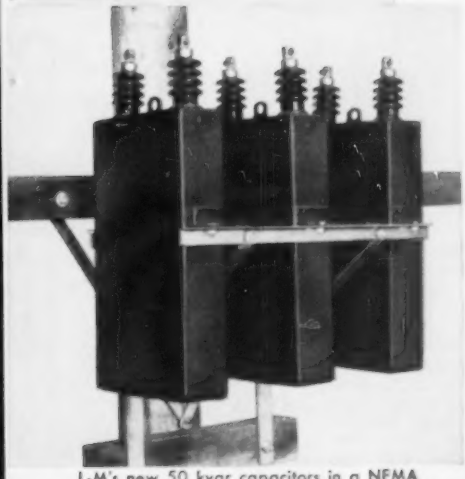


300 kvar multi-row switched capacitor rack with L-M's 50 kvar capacitors. Switched racks are supplied with dependable L-M Kyle type NR oil switches.



450 kvar, 2400 volt multi-row switched capacitor rack with L-M's 50 kvar capacitors. Weighs only 150 pounds more than a 300 kvar rack with 25 kvar capacitors.





L-M's new 50 kvar capacitors in a NEMA standard hanger. The capacitor has the same width, same thickness as 25 kvar capacitor and 10 inches of additional height. The three units provide 150 kvar—50% more than four 25 kvar units.

# L-M's New 50 KVAR Capacitors Provide Greater Capacity Per Pole

## Offer less weight and less pole space per KVAR

By **N. K. DELANEY**
Product Manager
Capacitors and Regulators
Line Material Company

Now you can hang capacitor racks of larger capacity on a pole with L-M's new 50 kvar Elemex® capacitors. Racks are factory-assembled and wired, shipped ready to install on distribution systems rated 2400 to 13,800 volts, multi-grounded wye. Bank sizes may be up to 450 kvar switched, 600 kvar unswitched multi-row racks, and up to 600 kvar switched or unswitched single-row racks.

### Less Weight per KVAR

Line Material's new 50 kvar, 2400 volt capacitor weighs 109 pounds compared to 68 pounds for a 25 kvar unit. A 600 kvar, 2400 volt unswitched multi-row rack weighs only 51% more than a 300 kvar rack, and a 600 kvar, 2400 volt switched single-row rack weighs only 43% more than a 300 kvar rack.

### Less Space per KVAR

L-M's new 50 kvar unit has the same width, same thickness as a 25 kvar capacitor and only 10 inches of additional height. It fits into existing NEMA standard hangers and into L-M's present single-row rack. Capacity of a single-row rack can be *doubled* with L-M's 50 kvar capacitors. A 450 kvar single-row switched rack with 50 kvar capacitors is approximately 2 feet narrower than a 300 kvar rack with 25 kvar capacitors. Handling, installation and maintenance costs per kvar have all been reduced with L-M's new 50 kvar unit.

### Other Features of L-M's Elemex Capacitors and Capacitor Rack Assemblies

Elemex capacitors are individually dried and completely impregnated under vacuum with low-temperature Elemex liquid dielectric.

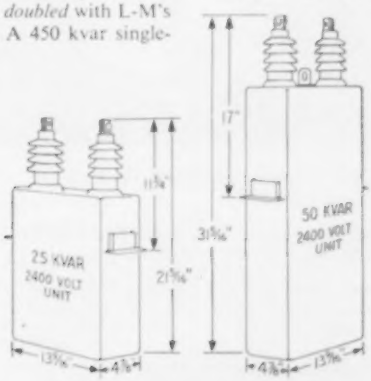
Unit has strong solder-sealed bushings of one-piece wet-process porcelain, "Paragroove" clamp-type connectors, and aluminum metallic coating under alkyd resin paint.

Assemblies have only one plug-in connection point per phase for control wiring, and one terminal box for all three phases.

Assemblies are of complete bird-proof construction; terminals have neoprene rubber caps, plus 5 kv insulated conductor for high-voltage connections.

### Get Complete Information

Ask the L-M Field Engineer for information on features, design, and delivery on the new 50 kvar Elemex capacitors and capacitor equipments. Or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).




**Only 10 inches of additional height gives twice the capacity.**

**LINE MATERIAL**

*Elemex® Capacitors*

**Leads** of 48-inch 600-volt #12 wire furnished as standard equipment.

**Bushing-Mounted Indicating Fuse** with 48-inch lead can be supplied.

**Solder-Sealed Bushings** of strong one-piece wet-process porcelain provide a positive, lasting seal.

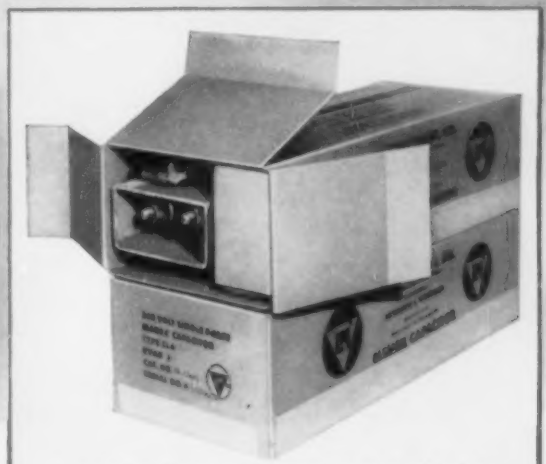
**Pole-Mounting Bracket** has two 9/16" holes for ½" lag screws. Standard EEI-NEMA crossarm-mounting bracket furnished if required. Capacitor can be mounted with bushings up or down.

**Aluminum Metallizing** process protects steel tank from oxidation; is followed by a chromate primer and a finish coat of alkyd resin paint.

**Single-Pack, Round-Tank Design** makes these capacitors small, light, easy to install. Unit has a one-minute discharge resistor; is completely impregnated under vacuum with low temperature Elemex liquid dielectric.

LM® LINE MATERIAL

Left: L-M's 5 kvar is 18⅛" high, weighs only 25 lbs. The 3 kvar is 13¾" high, weighs 18 lbs. These weights include the pole-mounting brackets. Standard EEI-NEMA crossarm-mounting bracket furnished if desired.



L-M's unique shipping carton permits inspecting and testing capacitors without removing them from the carton, simply by opening the end flap—which can be resealed.

### Small, Light, Easy to Install . . .

# L-M's New Secondary Capacitors Provide Needed Vars For Air-Conditioning Loads

Solder-sealed bushings, aluminum metallized finish on tank, and single-pack construction assure long life, low maintenance.

By **BLAINE SCHULTZ**
Section Engineer
Capacitors
Line Material Company

L-M's new secondary capacitor is your solution to the problem of poor voltage regulation and overloaded transformers caused by low-power-factor air-conditioning loads.

The unit is small, light, and rugged; easy to install on crossarm or direct pole mounting. It offers you outstanding design features, such as aluminum metallized tanks, solder-sealed bushings, one-minute discharge resistor, single-pack round-tank construction, and low-temperature Elemex liquid dielectric.

### Protective Coating

L-M's unique aluminum metallizing process prevents oxidation of the steel tank and greatly extends the life of the capacitor. This process is followed by a chromate primer and a finish coat of alkyd resin paint. The finish coat is dark in color to facilitate heat radiation and keep the capacitor at low operating temperatures.

### Solder-Sealed Bushings

Strong solder-sealed bushings of one-piece wet-process porcelain provide a positive, lasting seal. By eliminating gaskets and clamps we eliminate leakage. Therefore the capacitor can be mounted with bushings up or down.

### Pack Construction

The packs are assembled in air-conditioned rooms to assure uniformity and are tested with over-voltage to eliminate any actual or potential defects. The units have a one-minute discharge resistor to assure safe handling and storage.

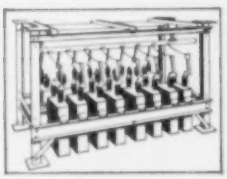
L-M's new 240-volt, pole-mounted, secondary capacitors are available in 3 and 5 kvar. 48-inch leads are furnished and external bushing-mounted indicating fuses can be supplied when required.

### Ask us for complete information

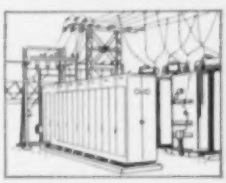
Ask the L-M Field Engineer for complete information on construction and application of L-M's secondary pole-mounted and submersible capacitor equipments, 2400- to 13,800-volt equipments, and our capacitor bank engineering service. Or write Mr. Delaney at Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

### Other L-M Capacitor Equipments

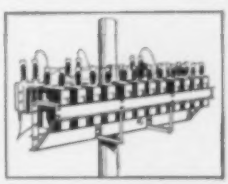
L-M offers a complete line of power capacitor equipments, such as these:



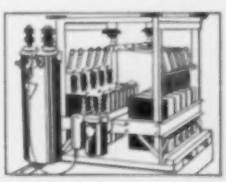
Factory-assembled blocks, which save time and money in building large banks.



Metal-enclosed capacitor equipments in all NEMA-standard sizes and ratings.



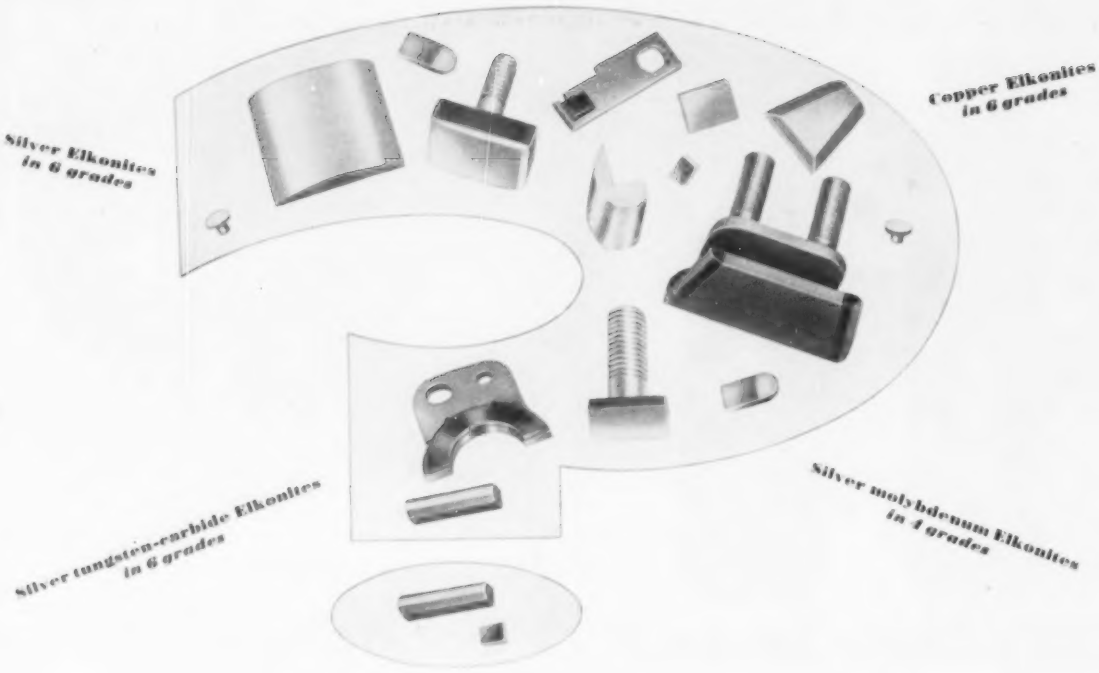
Factory-assembled racks for pole-mounted banks, both three-row and single-row styles.



VDS-Method factory-assembled block for multi-step bank switching—an exclusive L-M method that offers a substantial saving on switching equipment.

Also custom-designed protective and switching schemes.

**Elemex® Capacitors**


Silver Elkonites in 6 grades
Copper Elkonites in 6 grades
Silver tungsten-carbide Elkonites in 6 grades
Silver molybdenum Elkonites in 4 grades

# *which* ELKONITE® *material*

## *fits your* CONTACT *requirements?*

EVERY heavy duty electrical contact application poses its own problems. Electrical conductivity, contact resistance to arc erosion, sticking and welding, high mechanical strength, wear resistance . . . all of these qualities may be demanded in dozens of different combinations, and in many varying degrees.

To satisfy these diversified needs, Mallory has developed a complete series of Elkonite materials. By means of specialized Mallory metallurgical techniques, these materials combine metals which do not alloy by conventional means. They afford a combination of the electrical properties of copper or silver, with the refractory qualities of tungsten, molybdenum or their carbides.

From among the many Elkonites, you can choose a contact material that meets the electrical and physical specifications of your design. Often, combinations of dissimilar Elkonites (or the use of Elkonite with such materials as copper, silver or tungsten) give the best possible performance. Mallory Elkonites are *versatile* contact materials.

Call on Mallory for competent engineering assistance on your contact design problems. Call on our manufacturing facilities, too, to fabricate complete contact assemblies to your specifications. For technical data or a consultation on your application, write or call Mallory today.

*In addition to the family of Elkonite materials for contacts, Mallory makes many other "families" of contact materials including silver, tungsten, molybdenum, platinum Elkonium®, palladium Elkonium, copper and copper alloys.*

***Expect more . . . Get more from***

**P. R. MALLORY & CO. Inc.**

**MALLORY**

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

**Serving Industry with These Products:**

**Electromechanical**—Resistors • Switches • Television Tuners • Vibrators

**Electrochemical** — Capacitors • Rectifiers • Mercury Batteries

**Metallurgical**—Contacts • Special Metals and Ceramics • Welding Materials

*WHEN YOU SEE THIS POLYEX* INSULATION*

*IT MEANS . . .*

# Your New G-E Motor Will Last Up To 50% Longer

GENERAL ELECTRIC

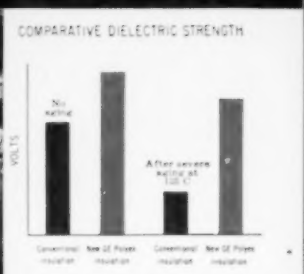
*Trade-mark registration applied for.

***SEE OVER . . . How you benefit from this revolutionary new development***

## 7 TIMES GREATER PHYSICAL STRENGTH

Cut-Through Test proves G.E.'s new insulation has extra protection against greater physical stress.

## 50% HIGHER DIELECTRIC STRENGTH

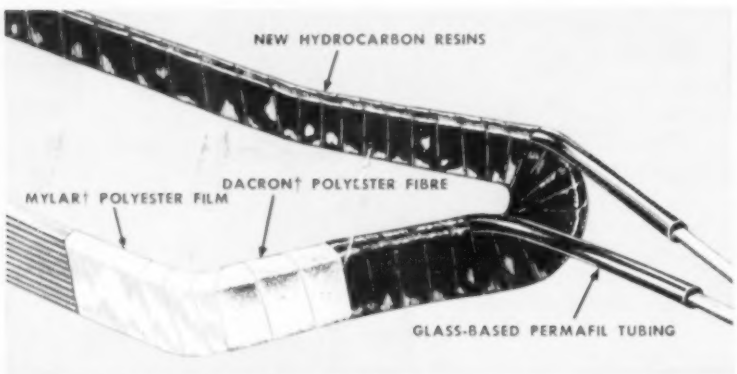



Tests prove new Polyex insulation can withstand much higher voltage stresses even after heat aging.

**An important development for users of motors from 100 to 3000 HP. . . . . .**

# NEW *POLYEX* insulation developed by G.E. is 7 times tougher, adds years to motor life

Your new General Electric motors, in the 100 to 3000 HP range, will last 50% longer because of a revolutionary new insulation system called Polyex. A class A system, Polyex is composed of amazing new polyester films and fibres with a combination of toughness and high dielectric strength never before available in motor insulating materials. G.E. conducted hundreds of tests to find just the right balanced system of polyester films and fibres and hydrocarbon resins that would be able to stand increased physical and electrical stresses. The result is Polyex—the first major advance in motor insulation in 45 years.




**G.E.'s NEW Polyex** Insulation System for the first time takes advantage of new polyester film and fibres and hydrocarbon resins with natural insulating qualities of their own. Materials requiring impregnation for dielectric strength have been completely eliminated.

### MANY BENEFITS

This new insulation system offers seven times greater cut-through strength, four times greater tensile strength, at least twice the contaminant resistance, 50% greater dielectric strength. This can add up to tremendous savings in reduced maintenance, reduced motor failures and longer trouble-free motor operation.

### AVAILABLE IN COMPLETE LINE

The many advantages of Polyex insulation are now available to you *at no extra cost* in form wound General Electric induction motors from about 100 to 3000 HP. Your G-E Sales Representative has complete information. Contact him at the General Electric Apparatus Sales Office in your area. General Electric Company, Medium Induction Motor Dept., Schenectady 5, New York.

† DuPont trademark
* Trademark registration applied for.

635-3

*Progress Is Our Most Important Product*

GENERAL ELECTRIC

## *HERE ARE G-E LARGE MOTORS EQUIPPED WITH POLYEX INSULATION*

Vertical TEFC and weather-protected | Totally-enclosed fan-cooled | Open drip-proof | Grade-mounted weather-protected | Base-ventilated weather-protected | Totally-enclosed air-water cooled | Boiler feed pump

# VARNISHED CAMBRIC CABLE

**In single conductor sizes from #14 A.W.G. to 2,000,000 C.M. In multiple conductor sizes from #14 A.W.G. to 750,000 C.M. For use up to 17,000 volts between conductors for non-shielded multiple conductor cables; for single conductor and shielded cables operating on an ungrounded neutral system not over 21,000 volts between phases, and for single conductor and shielded cables operating on a grounded neutral system not over 28,000 volts between phases.**

Insulated with varnished cambric tape, in accordance with I.P.C.E.A. and Underwriters' specifications unless otherwise specified by you.

Manufactured with solid conductors or stranded in a variety of strandings, coated or uncoated, according to your needs. Available in single or multiple conductor.

For outside covering, you have a choice of braid, for service in dry locations; lead, for service in damp locations; and for aerial use or direct burial we recommend a protective armor such as steel tape or galvanized round wire armor.

AS LEADS FOR MOTOR AND OIL SWITCHES, GENERATORS, TRANSFORMERS,

**YOU WANT**

- TOP RESISTANCE TO HIGH OPERATING TEMPERATURES, OIL AND GREASE;
- DEPENDABILITY THAT SAVES REAL TIME AND MONEY—

IN SHORT,

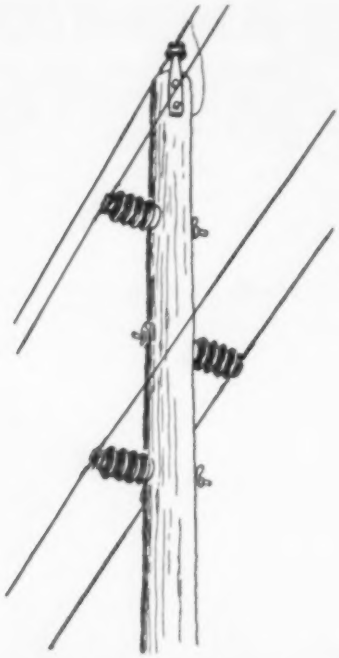
**YOU WANT**

# ROEBLING

*Subsidiary of The Colorado Fuel and Iron Corporation*

**JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J.** BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 11-15 STILLING ST. • CHICAGO, 5656 W. ROOSEVELT RD. • CINCINNATI, 2353 FREDONIA AVE. • CLEVELAND, 13235 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 916 FISHER BLDG. • HOUSTON, 6316 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH, 1723 HENRY W. OLIVER BLDG. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

CFI



# A TROUBLE-FREE DISTRIBUTION LINE AT LOWEST COST

You can eliminate the cost of cross-arms, braces, brackets and other hardware—and probably build the best-performing distribution line on your system—by using new Lapp Distribution Post insulators. You just mount 'em horizontally, bolted directly to the pole.

This practice has the precedent of companies that have built such lines with regular Lapp Line Posts —and report them as "completely trouble-free."

The two Distribution Post units, for duty at voltages up to 25 Kv, both develop 1500 lbs. cantilever strength at insulator top. Constructed as a solid one-piece porcelain, they are completely crack-proof and puncture-proof. With Lapp Fog-Type corrugations, they present an exposed uniform leakage path—most efficient for use in contaminated atmosphere. Radio-free by design, and greatly more rugged than any other type of distribution insulator against flashover, stones and bullets. Separable stud bolts provide for their use with studs of any length.

For application in dirt condition areas, horizontal mounting adds the extra advantage of *better* cleaning in wind and rain.

Write for complete description and specifications. Lapp Insulator Co., Inc., Le Roy, N. Y.

LAPP
DISTRIBUTION
POSTS

**Lapp**



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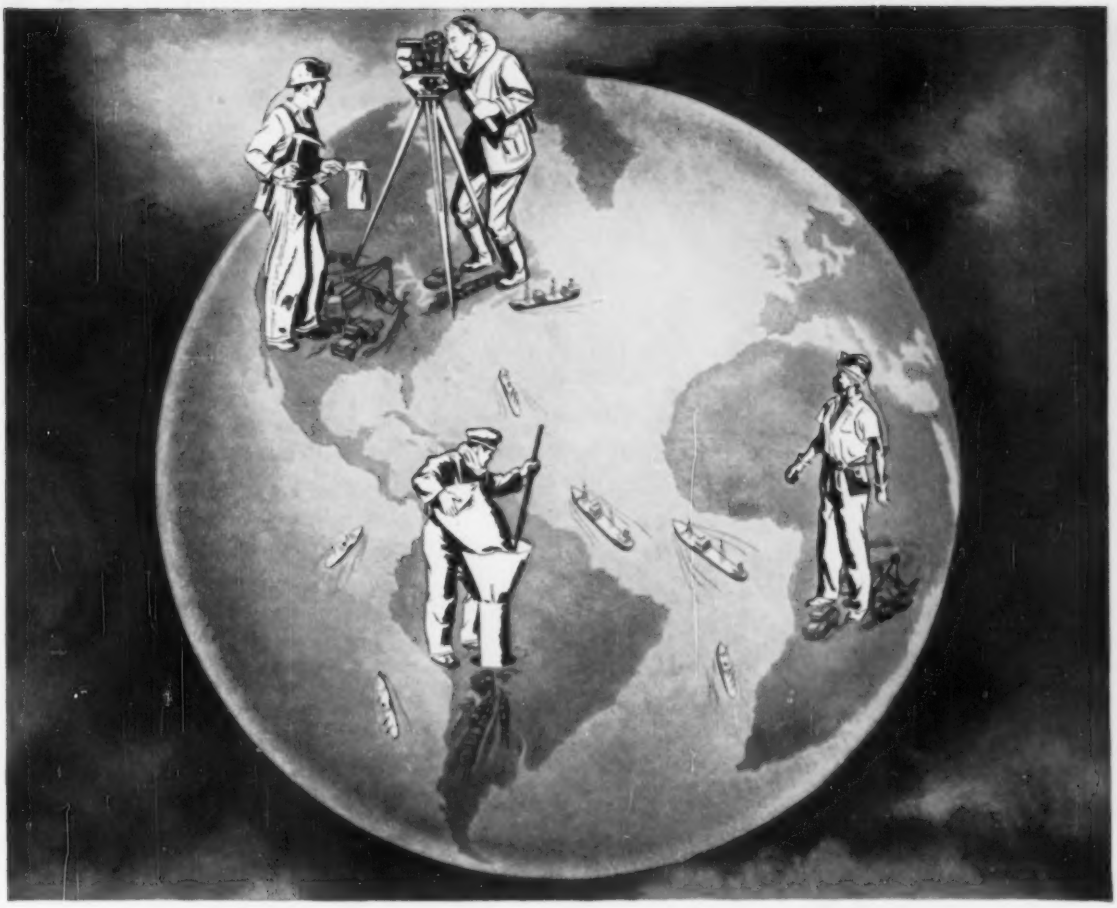

# MORE COPPER IS COMING

Never before has peacetime copper output been so great.

In 1955 alone, free world refined production totalled an estimated 2,732,997 tons. Yet even today's record tonnages will be exceeded as new copper mines swing into full production and existing properties expand operations.

*On the African continent*, substantially increased production is expected from Bancroft, Chibuluma, and Kilembe.

*In South America*, expansion at El Teniente, Chuquicamata and La Africana, has been announced. Under development are Cuajone, Toquepela, Quellevaco, and Indio Muerto.

*In the United States* (already the world's largest producer), San Manuel, Butte, Tripp, White Pine, Osceola, and Pima mines are headed for greater output.

*Canada* will add more production at Gaspé, Campbell Chibougamau and Opemiska. Many new properties are being developed. Substantial future output is expected from Brunswick, Geco, Granduc and Canam, to mention only a few of these new projects.

The copper industry has the capacity to produce copper faster than ever.

From known deposits . . . from mines now under development and from ore bodies now being explored . . . more copper is on the way. For particulars, write today to Copper and Brass Research Association, 420 Lexington Avenue, New York 17, New York.

## COPPER & BRASS RESEARCH ASSOCIATION

. . . AN INDUSTRY SOURCE OF TECHNOLOGICAL AID, INCLUDING A LIBRARY OF TECHNICAL LITERATURE AND A COUNCIL OF SPECIALISTS.

**COPPER OR ITS ALLOYS PROVIDE THESE ADVANTAGES:**

Best conductor of electricity commercially available

Does not rust . . . High corrosion resistance

Best heat transfer agent of all commercial metals

Easy to machine, form, draw, stamp, polish, plate, etc.

Welds readily . . . Excellent for soldering and brazing



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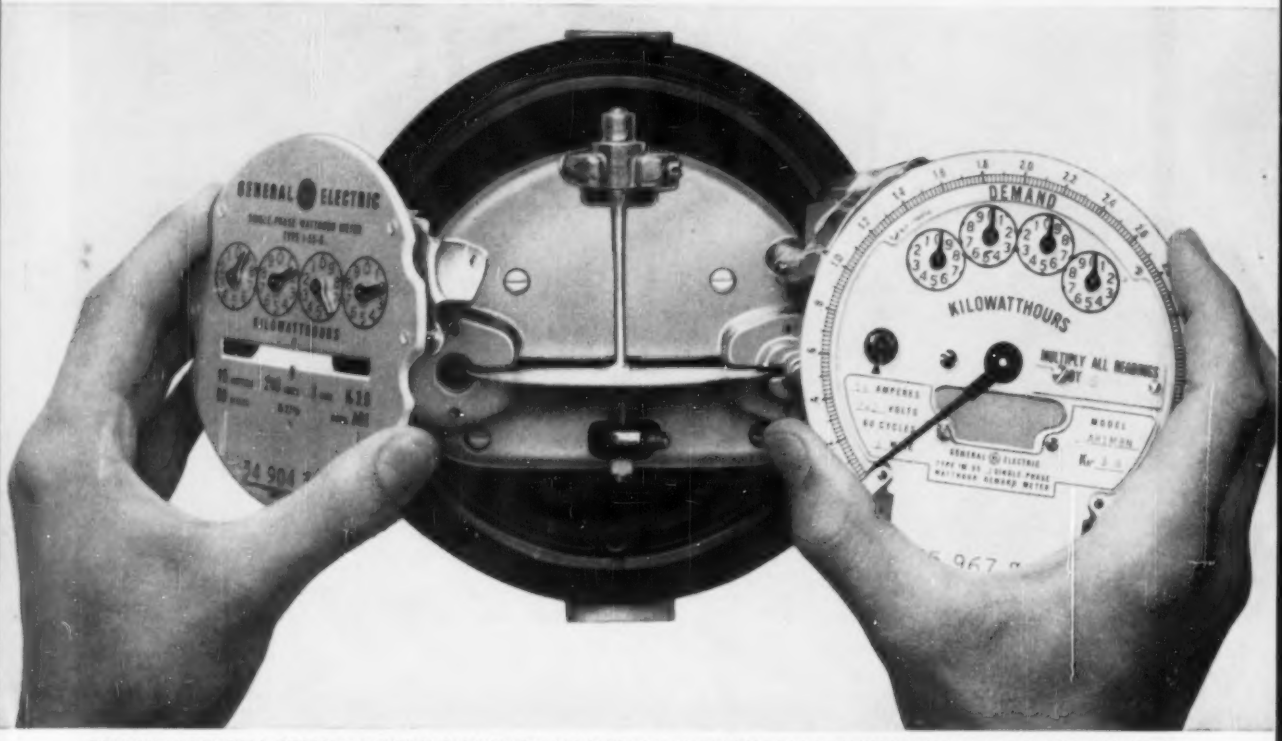
# DEMAND METERING




DEMAND REGISTERS OFFER MAXIMUM FLEXIBILITY, MAY BE INSTALLED ON ANY G-E SINGLE-PHASE OR POLYPHASE METER

## Demand Registers: The Most Reliable Means to Low Cost Demand Metering

- Increasing number of utilities are taking advantage of the benefits offered by demand registers
- Flexibility of register assures reduced inventory and operating costs
- Greatly reduced testing and maintenance expenses have resulted from improved designs

The dependable low-cost operation of mechanical demand registers has led to their increasing acceptance by the utility industry.

General Electric engineers have released test results which give assurance of increased reliability of demand registers. These tests show that the life of the register rotor has been extended up to 10 years. This fact means that the register will need testing and maintenance only during periodic meter tests. This assurance of dependable performance offers the utilities unlimited savings in their demand metering operation.

**DIRECT GEAR DRIVE . . .** Not only is the register on the same testing basis as the meter but also the demand register possesses the same stability of calibration as the watthour meter. This high degree of accuracy remains unchanged during life, and thus assures reliable operation for years. In comparison with other types of demand metering devices, the register is relatively unaffected by such variables as friction and climate.

**REGISTER FLEXIBILITY . . .** The versatility of design of General Electric's demand register offers the opportunity of converting the register to different scale classes, different electrical ratings, or any

available time interval. Standardization on one register ratio with a change in only the multiplier is but one of the many cost-saving methods which is available with only a demand register.

**REDUCED INVENTORY . . .** The opportunities for reduced inventory are unlimited with the use of demand registers. Any stock single-phase or polyphase watthour meter can be converted to a demand meter merely by substituting a demand register. This adaptability which results in reduced inventory and operating costs is unique only with demand registers.

**IN SERVICE . . .** A watthour meter can be readily converted to a demand meter simply by the interchanging of registers. Also, quick, easy, accurate and low-cost field testing can be realized with demand registers. With the use of a G-E self-checking adapter, the need for elaborate testing equipment and costly hours of labor is eliminated.

These facts offer you the greatest possible assurance that General Electric's demand registers are your most reliable means to low-cost demand metering.

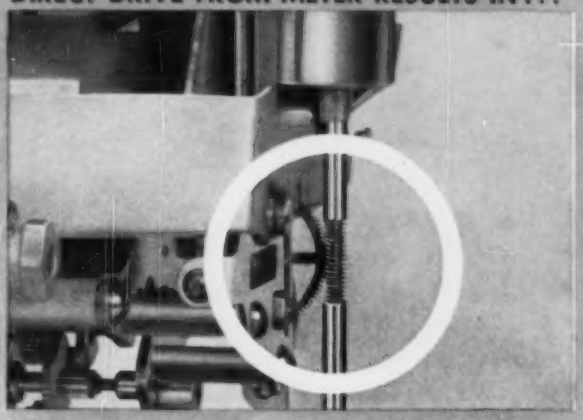
**MANY UTILITIES . . .** Increasing numbers of utilities are taking advantage of the benefits offered by demand registers. Here are but a few: Commonwealth Edison Company, Wisconsin Electric Power Company, Kansas Power and Light Company, Duke Power Company, Pacific Gas and Electric Company, Southern California Edison Company, Public Service Company of Oklahoma, and New Orleans Public Service Inc.

**FOR MORE INFORMATION . . .** If you would like more information on General Electric's mechanical demand registers, write to Section 621-12, General Electric Company, Schenectady 5, N. Y.

*Progress Is Our Most Important Product*

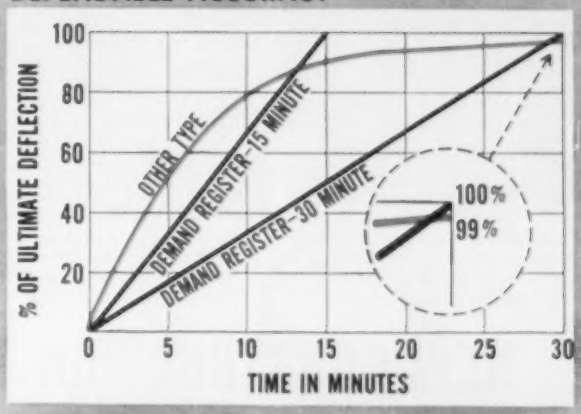
GENERAL ELECTRIC

**DIRECT DRIVE FROM METER RESULTS IN . . .**



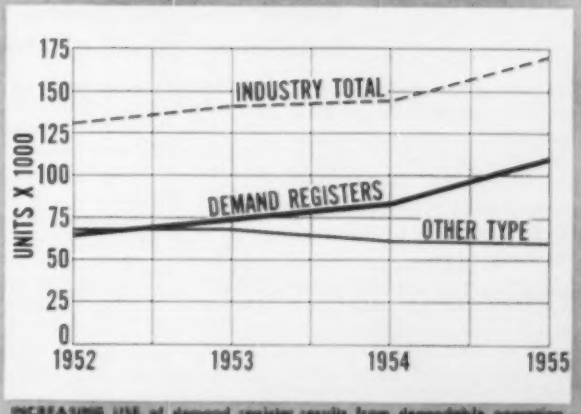
DIRECT GEAR DRIVE from the meter assures sustained accuracy for years.

**DEPENDABLE ACCURACY**

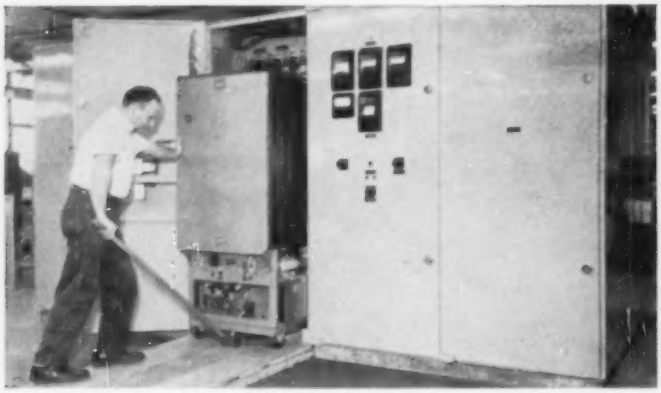



ONLY REGISTERS reach 100% of average demand after rated time interval.

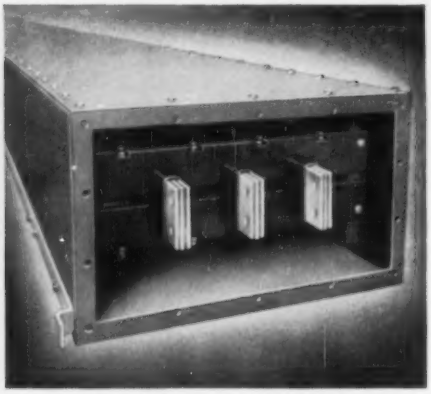
**INCREASING UTILITY USE**




INCREASING USE of demand register results from dependable operation.

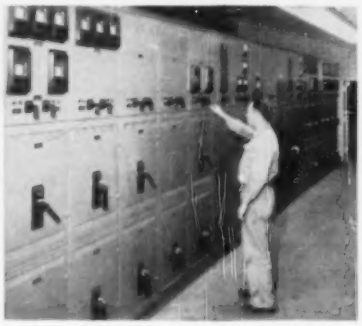


**Metal-clad switchgear.** Horizontal drawout air circuit breakers in rigid, all-welded enclosures. Available in ratings from 2400 v through 15 kv—50 through 500 mva interrupting and 2000 amp continuous.

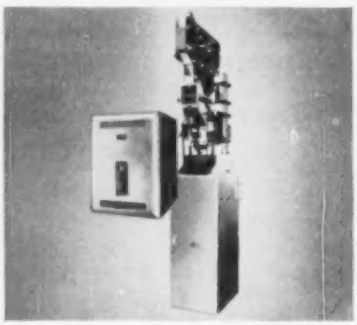


**Nonsegregated phase, metal-enclosed bus.** For switchgear connections. In ratings 600 v through 6000 amp; 5, 7.5 or 15 kv through 5000 amp.

**Unit substations.** I-T-E primary and secondary unit substations can be supplied for any application—indoor and outdoor—and in any standard rating.



**Low voltage switchgear.** Ratings through 600 v a-c, 250 v d-c, 6000 amp continuous, 15,000 through 150,000 amp interrupting.



**Individual breakers.** I-T-E large air circuit breakers are available in a wide range of types and ratings, 600 v a-c, 250 v d-c, 750 v d-c.

# NEW CONSTRUCTION ECONOMY TIP: BUY AN I-T-E "POWER PACKAGE"

## Coordinated engineering, delivery and installation means a better investment

An I-T-E "power package" includes the complete power handling facilities you need for a new construction project, building addition, or simple expansion of electrical service—one unit or a complete system for application from generation to end use. You save many ways:

**Sound planning.** Talk with your local I-T-E application engineer about your general power requirements before you build. He'll work with you to determine the equipment needed to assure complete protection with greatest economy in total investment, operating costs, and construction time.

**Easier installation.** Before you begin construction, I-T-E will supply you with arrangement and channel base drawings. Equipment is factory assembled, tested and ready to install. Standardized frames and panel elements assure that future additions to your switchboard will match and line up.

**Coordinated delivery.** Shipments are made from I-T-E according to a predetermined schedule. Each part of the complete "power package" is delivered to the job when needed. This saves delays and eliminates inconveniences.

**Assured performance.** Since I-T-E will supply all equipment—pre-engineered—you are saved the work of coordinating equipment of different manufacture. You can be sure that the separate parts of an I-T-E "power package" will fit and function together.

For details, contact the I-T-E sales office nearest you—look in your classified directory under "Electric Equipment." I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.

I-T-E

**I-T-E CIRCUIT BREAKER COMPANY**
**Switchgear Division**

# Taps tight.... can't freeze!

## KEARNEY
### *Protected-Thread*
# CON-NEC-TAP CLAMPS

Months or even years from now, Con-Nec-Taps are as easy to take off as they were to tap on, because the screw threads are completely enclosed in a grease-filled chamber. You'll never need to cut these clamps off the line . . . in fact, you'll save by being able to use them over and over again.

A heavy, double-coil spring washer resists vibration and compensates for expansion or contraction. You are sure of a high-pressure contact under all conditions. Kearney Con-Nec-Tap Clamps are available for all types and sizes of conductors.

Fully sealed grease chamber prevents corrosion
Heavy stainless steel spring washer compensates for expansion and contraction . . . prevents loosening.

*Sure-Lok clampstick for installing clamps at extreme angles*

*New Process Plastic Pole Coating:*

**KEARNEKOTE*** tough, high-dielectric plastic is bonded directly to the wood of KEARNEY Live Line poles.

*Registered Trade Mark. 278R

*For Better Construction . . . Safer Maintenance*

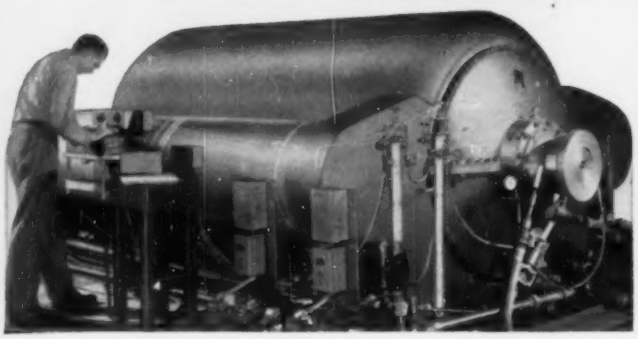
*Specify* **KEARNEY PRODUCTS**

JAMES R. KEARNEY

*The Mark of Quality*

JAMES R. KEARNEY CORPORATION • 4234-42 CLAYTON AVENUE, ST. LOUIS 10, MISSOURI • Canadian Plant: GUELPH, ONTARIO

# *Fully* Super



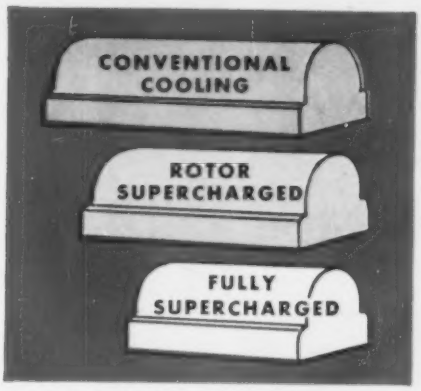
**TEST UNIT** establishes a basis for designing 3600-rpm units that can be rated 300 mw and higher. On initial test setup, the fully supercharged generator was given heat runs at various hydrogen pressures. Tests showed the output is more than doubled as a result of fully supercharged cooling.

Designers' model approximates appearance of fully supercharged generator on 150,000-kw steam turbine unit.

A-C ALLIS-CHALMERS

**ALLIS-**

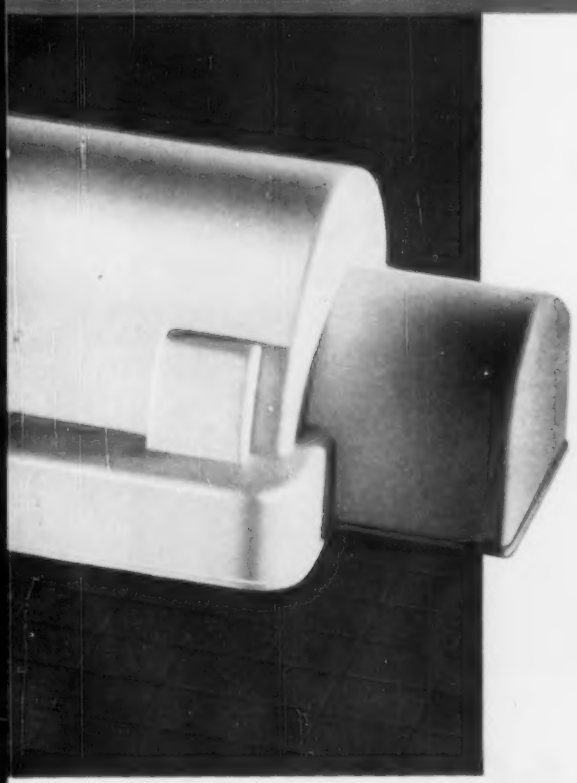
# charged cooling!




**OUTLINES SHOW ADVANTAGES** in comparable length . . . first with rotor supercharging . . . and now with full supercharging to reduce size even further.

*Now*

## Allis-Chalmers reports on tests of a generator with supercharged cooling of both rotor and stator



EXPERIENCE shows that supercharged cooling pays off. The Allis-Chalmers pioneered development, applied to rotors only, already delivers important savings to utilities. Five steam turbine-generator installations now have a combined total of eight years' operating experience. Plants can be smaller, less costly to build. Switchgear costs are lower. Shipping and installation are simplified. Important operating advantages have been proved.

A fully supercharged generator test unit — with supercharged cooling applied to both rotor and stator — has now been built. It has mechanical, magnetic and cooling features which permit maximum utilization of Allis-Chalmers supercharged cooling design. This design provides conductor cooling with high velocity gas flowing over ample exposed area.

### Performance surpassed expectations

Test efficiencies exceeded predictions and temperatures were favorable. Electrical characteristics were exceptionally favorable. Mechanical features, including thrust-type hydrogen seals, proved unusually effective.

Overall tests show that fully supercharged cooling — of both rotor and stator — will provide steam turbine generators with advantages in size and performance far superior to previously built designs.

Complete information on these tests is available in "Fully Supercharged Generator — Performance Exceeds Expectations." Get a copy from your nearby Allis-Chalmers office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-4441

# CHALMERS

# Here's Proof of Performance...

## Over 99% of pressure-creosoted poles installed since 1923

### *still in very good, serviceable condition*

• All over the country electric and telephone utilities are taking advantage of the long-lasting properties of pressure-creosoted utility poles. Take the example of the New York State Electric & Gas Corp., Binghampton, New York.

Mr. H. L. Livingood, Distribution Engineer, tells about their use of pressure-creosoted poles. "It's hard to say when we started using pressure-creosoted poles. We set a few as far back as 1888, though we didn't start using them in real quantity until 1923. By 1931 we abandoned untreated poles altogether.

"It's difficult for me to estimate the service we expect from the creosoted poles, since they've already lasted over 30 years. We have had to replace a very few, far less than one per cent. We don't anticipate setting up a replacement program for creosoted poles until about 1960. And even then we expect that only a very few will be ready for replacement. So if you ask me to estimate the life of our creosoted poles, all I can say is, considerably longer than 30 years."

As this excellent case history proves, in many, many instances the life of pressure-creosoted poles far exceeds the expected 30 years. For more information on pressure-creosoting, and on USS CREOSOTE, get in touch with our nearest Coal Chemical sales office, or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

**Mr. Livingood points out one of the 1923 poles. Pole is still strong, good for many more years of service.**

*You can obtain clean pressure-creosoted poles upon specification without sacrificing pole service life.*

# USS CREOSOTE

USS

5-2400

SALES OFFICES IN PITTSBURGH, NEW YORK, CHICAGO CLEVELAND, SAN FRANCISCO AND FAIRFIELD, ALA.

UNITED STATES STEEL

# Cost Saving POLE TOP SWITCHING

## ALTO
## LINE TAP-OFF SWITCHES
### Cut Cost on –

**CONSTRUCTION**—one wood pole required instead of two or four.

**INSTALLATION**—a single rack for each pair of switches, requiring a minimum of additional installation time and effort.

**MAINTENANCE**—only one assembly to inspect and service.

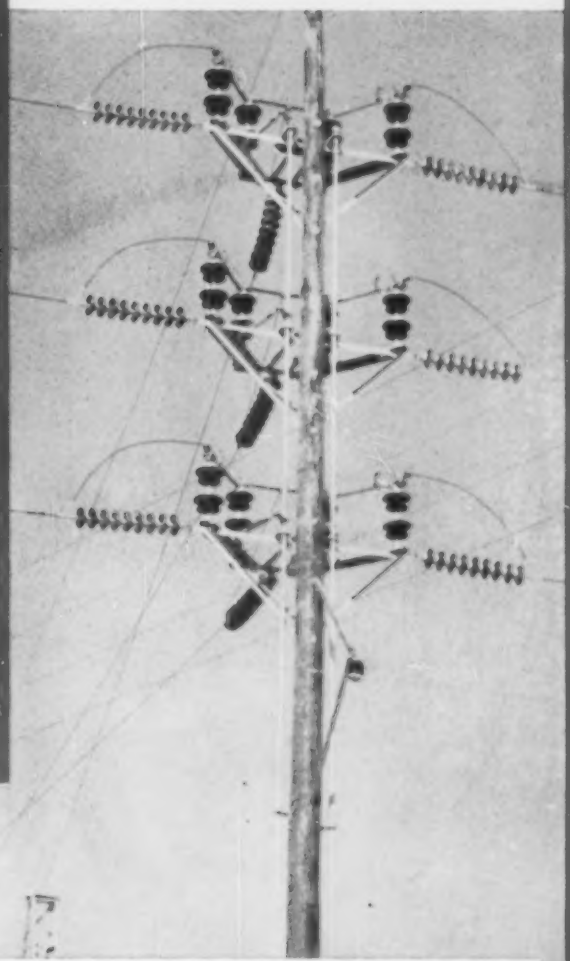
**RIGHT OF WAY**—less property to occupy.

*featuring the*

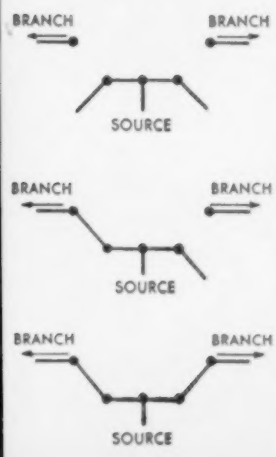
**R&IE**

## ARC RESTRICTOR

for interrupting Line Charging Current or Transformer Magnetizing Current. ALTO Switches will increase the mileage between switch locations when interrupting line charging current.



**TYPICAL SWITCHING APPLICATION**



Two-way (illustrated) or Three-way switching not only cut costs of installation and maintenance, but they give you a new safe way to solve your growing switching problems. The R&IE ARC RESTRICTOR quick break horns snap the arc before it can start. Start planning now—write for full information—ask to see the motion picture test films which demonstrate, beyond all belief—the performance of the ARC RESTRICTOR.

**R&IE EQUIPMENT DIVISION**
I-T-E CIRCUIT BREAKER CO.
GREENSBURG, PA.

STRUCTURES—steel or aluminum ● TESTING DEVICES ● KIRK KEY INTERLOCK SYSTEMS ● ISOLATED PHASE BUS STRUCTURES ● INTERRUPTER SWITCHES

INDOOR BUS SUPPORTS and BUS FABRICATION ● OUTDOOR BUS SUPPORTS and AIR SWITCHES ● SUBSTATION

DISTRIBUTION
TRANSFORMERS
ATANA*

2. G-E SERVICE SHOPS—
MORE THAN 30 LOCATIONS

1. ENGINEERING HELP—
SALES & APPLICATION ENGINEERS,
TRANSFORMER SPECIALISTS

NDOOR BUS SUPPORTS and BUS FABRICATION ● OUTDOOR BUS SUPPORTS and AIR SWITCHES ● SUBSTATION

3. REPLACEMENT PARTS—
FOR UPRATING OR REBUILDING

4. G-E WAREHOUSES—
45 STOCKING POINTS

## Four areas which show that

# SERVICE HELP IS AVAILABLE

Here's the kind of help available with every General Electric distribution transformer you buy:

**Engineering help.** Sales and application engineers, transformer specialists are available to every customer. Highly trained, these men can provide valuable assistance in your planning or day-to-day problems.

**G-E service shops**—31 throughout the country—are as close as your telephone. They are ready to help you in any emergency or to give routine service in your maintenance program.

**Replacement parts** permit uprating or rebuilding. Whether it's a complete core-and-coil or just a broken part, G.E. is ready to help you. We can furnish the parts or do the whole job.

**G-E warehouses.** 45 easy-to-reach places where thousands of G-E transformers are stocked. You can get off-the-shelf delivery of almost all standard ratings.

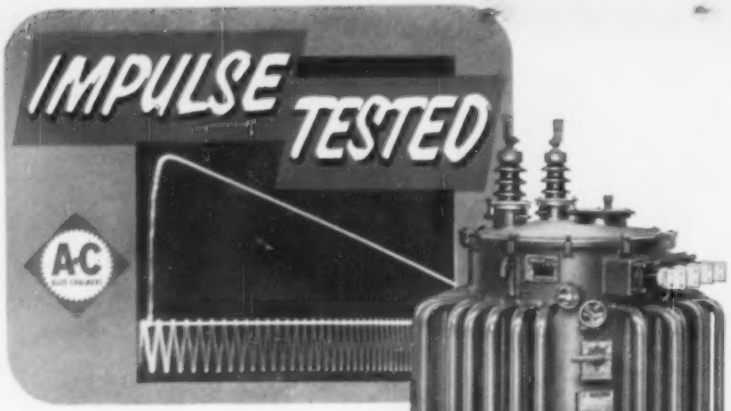
431-24

ATANA. When you need service, remember *All Transformers Are Not Alike* and go where the help you need is always available. General Electric Company, Schenectady 5, New York.

CONVENTIONAL—SELF PROTECTED
take your choice
General Electric makes both

*Progress Is Our Most Important Product*

GENERAL ELECTRIC




# Through 500 KVA

## PROOF of Insulation Quality

on all Allis-Chalmers distribution transformers through 500 kva, 69 kv and below is now shown on every unit. The "Impulse Tested" Seal is put on to show that each unit has been checked with the most modern impulse testing equipment and techniques known to the industry.

Production-line impulse testing was initiated by Allis-Chalmers eight years ago for pole-type units. Now these tests that assure insulation quality are made on every distribution transformer shipped by Allis-Chalmers, including both conventional and self-protected units.

Tests are made without lightning arresters. Allis-Chalmers checks the transformer, not the lightning arrester.

Get the facts about these and other Allis-Chalmers tests and manufacturing procedures that result in distribution transformers of the highest quality. Call the A-C office nearest you, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin. A-4851

*EVERY*

*Allis-Chalmers Distribution Transformer gets this test of Quality*

A-C ALLIS-CHALMERS

**ALLIS-CHALMERS**

# EXCEEDS CLASS III SPECIFICATIONS

Wet or dry, pick your flashover test, NEW Kimble *Tempered* Glass insulators show flashover resistance exceeding A.I.E.E. requirements. In puncture tests, too, *Tempered* Glass insulators are outstanding. It has proved impossible to puncture them in air, even under the most severe maximum voltage impulses applied. Four years of field testing on more than 500 miles of line have produced no puncture failure. Even lightning surges have failed to damage them.

**If it's on the pin, it's in service**

In the event of shattering due to severe mechanical shock, insulator disintegrates into many small, non-sharp fragments. Trouble shooters can locate broken insulators—fast.

What's the secret? *Tempering*, a Kimble development in glass insulators that adds a new element to the many natural virtues of glass insulators. It's a Kimble production method that gives Kimble insulators a hard-compression surface layer that makes them strong enough to meet the severe test required. This great strength saves installation time because it's never necessary to loosen for line up with the conductor—they can always take another quarter-turn.

Why not see how *tempered* glass can cut your line maintenance costs. Write for folder. Address: Kimble Insulator Division, Owens-Illinois, Dept. EW-12, Box 1035, Toledo 1, Ohio.

KIMBLE INSULATORS
AN (O) PRODUCT

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GENERAL CABLE

THE GREATEST NAME IN ELECTRICAL WIRE AND CABLE

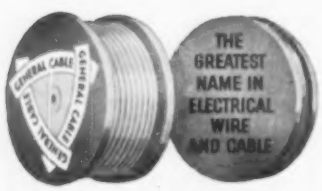
**A dramatic new advance** in electrical wiring for all applications up to 600 volts and wherever heat, vapors, moisture and aging are problems. Safety m.i. Wiring is ideal for low voltage, lighting, power, control, machine tool and equipment uses.

The mineral insulation of Safety m.i. Wiring is physically stable up to 2800° Centigrade . . . will not burn, deteriorate, support combustion, or convey flame . . . provides extra safety in boiler rooms, around steam pipes, boiler stacks and other "hot spots." Simple fittings seal both ends of wiring runs . . . no possible entrance for moisture.

**Underwriters' Approved** Safety (Type m.i.) Wiring Systems offers lower installation and maintenance costs. Acts as its own conduit . . . can be installed in one operation with standard switch and junction boxes. Easily shaped on the job, Safety m.i. can be fastened with standard clamps or straps . . . stays put permanently!

**Save time and money! Get a neater job! Simplify planning!** Ask your General Cable Representative for all the facts about Safety m.i. Wiring Systems. Remember, too, General Cable is the *only* manufacturer who can supply *all* your wire and cable needs!

GENERAL CABLE
CORPORATION

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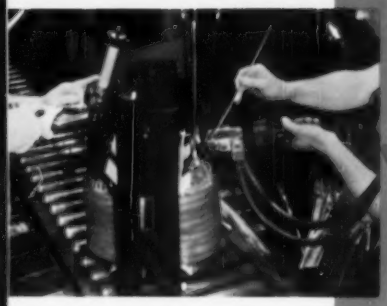
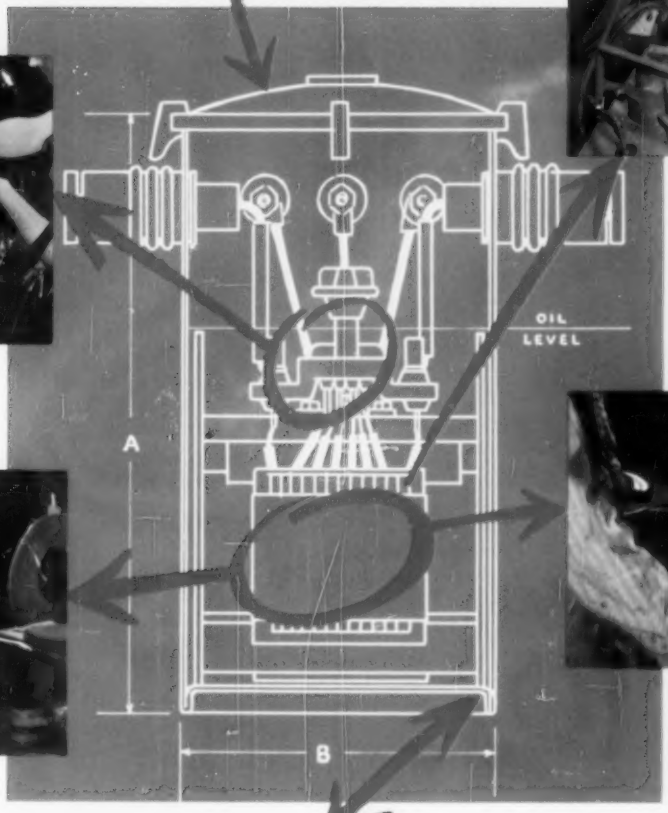
Bulletin No. H307-455

## DEPENDABILITY AT ITS BEST... ALL ALONG THE LINE

From one end of your distribution system to the other you can rely on Moloney HyperCore Transformers because... Feature by Feature, HyperCore Transformers are designed and fabricated to provide better overall operating performance.





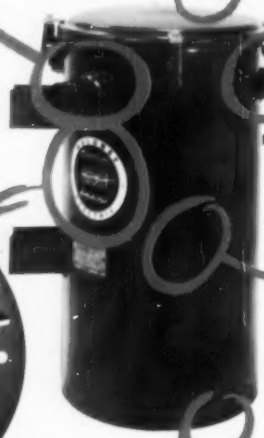
**MOLONEY ELECTRIC COMPANY**

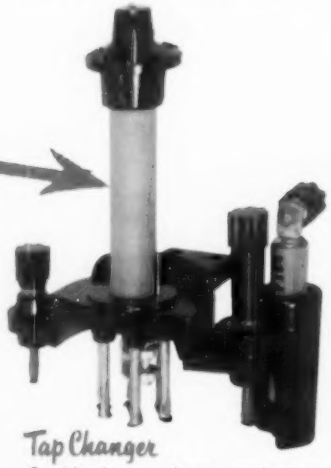
SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

**Covers**
Positive seal tank cover retains reusable gasket under pressure. Welded retaining ring returns all splashed oil to main body of tank.

**HV Bushing**
High-strength, wet-process porcelain, keyed for safety. Electro-tinned terminals accommodate copper or aluminum conductors.

**LV Bushing**
High-strength, wet-process porcelain, keyed for safety and are designed for either above or below vertical takeoff.





**Tap Changer**
Combination tap changer and voltage terminal block. Features high pressure contact and positive snap action. Operating handle located above hot oil level.

**Tanks**
Rust-resistant, copperbearing steel, resistance welded. Triple thick rolled base.

MOLONEY ELECTRIC

**From one end of Moloney's modern plant to the other, Moloney's facilities are devoted exclusively to designing and fabricating transformers that are better.**

***Specify Moloney . . . Get Dependability at its Best . . . All Along the Line***

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*Power Transformers • Distribution Transformers • Load Tap Changing Transformers • Regulating Transformers • Step Voltage Regulators • Primary Unit Substations • Secondary Unit Substation Transformers • Network Transformers • Series Street Lighting Transformers • Subway Transformers • Industrial Dry Type Transformers • Capacitors • Magnetic Components for Electronics*

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

# EDITORIALS

## Vennard—a Wise Choice

The Edison Electric Institute Board of Directors has chosen wisely in selecting Edwin Vennard, president of Middle West Service Co. to become next managing director of EEI.

It was no easy task to find an executive capable of filling the post which for so many years has been competently administered by Col H. S. Bennion. For more than a year the board has been casting about for a successor. Meanwhile, Bennion twice agreed to extend his retirement date. For this selfless devotion to duty as well as for his long and distinguished service, the member companies owe Bennion a vote of lasting appreciation.

In naming Vennard to fill the position, the EEI board has chosen a man who is a recognized leader in the industry. By his energetic, thoughtful, and competent service Vennard has distinguished himself and proved his abilities to assume the key post in the EEI organization. As Bennion will attest, and as Vennard well recognizes, it is a position which challenges the ability and tact of any man.

Vennard, when he assumes the post June 1, will bring with him a wealth of well-rounded experience in the broad electric utility field. This has been gained in work with a manufacturer, with several electric companies, and during his many years of service with Middle West.

His background includes training and experience in the technical, sales, rates, and public relations aspects of the industry. As president of Middle West Service he has gained a working knowledge of just about every phase of utility management and operations.

Members companies can have full confidence that the top staff job at EEI will remain in capable hands.

## Happy, Prosperous New Year

"Increased confidence in the future growth will lead management to plan further ahead and to plan more boldly." This forecast from our review section (p 65) well characterizes our view of the year ahead.

We sincerely believe that the optimism, the confidence, and the self assurance expressed in this forecast capture the spirit of the entire industry at this time of transition from an old to a new year.

The industry achievements of the past 12 months on many fronts have been outstanding and deserve the highest praise. But as management and personnel in the utilities well know, there is no time to rest on laurels in this industry. Past accomplishments bode only greater future requirements. Unsolved problems loom larger, and solutions become more pressing with each passing month.

The insatiable demand for electric power and the attendant growth and advances of the industry are a part of the drama of the industry. It is this demand that is the basis for the enduring prosperity of the industry. It is the achievement of growth, technical progress, improved service, better techniques and methods that is the basis for the pride and the happiness which one gains from being a part of the industry.

With every confidence of fulfillment, the editors of Electrical World wish you all a HAPPY, PROSPEROUS NEW YEAR.

## The Governor Is Realistic

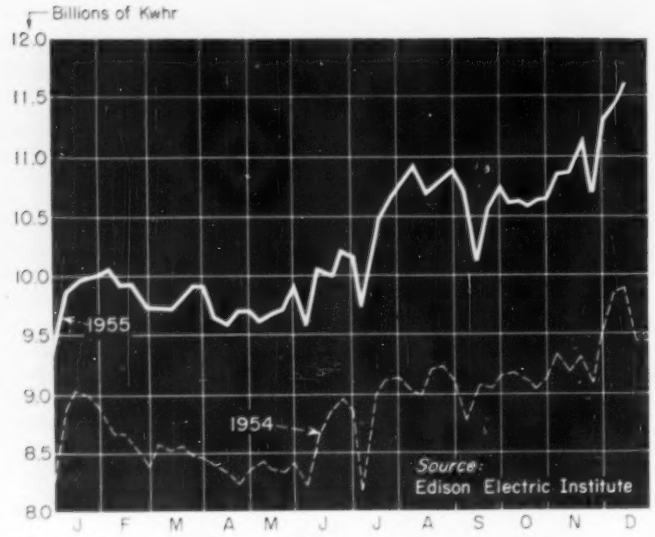
The State of Washington receives approximately 85% of the output of all the federally owned Columbia Basin power projects. Thus its dependence on federal power is great. Accordingly the federal power issue is politically potent in that state.

But Gov Arthur B. Langlie is enough of a politician and enough of a realist to know that his state cannot depend on the beneficence of the federal government to meet forever the increasing power needs. In a recent speech before a New York audience Langlie put the situation very pointedly:

"Now from our own viewpoint, and as governor of Washington, I would welcome it very much if the other 47 states wanted to invest more of their money in the development of the resources of our state. But I am realistic enough to know that you people in New York . . . are not going to finance the generation of an ever increasing amount of cheap hydroelectric energy for the benefit of the people of Washington."

For Langlie the Eisenhower Administration's partnership policy is the answer. "The sharing of financial participation, responsibility, and management seems to be the most logical and sensible, in fact the only possible solution to the problem we are facing."

Senators from the Pacific Northwest and other areas dependent on federal power should take heed.




## OUTPUT

**Week Ended Dec. 17**
**11,602,000,000 Kwhr**
**Up 17.1%**

**Atomic Energy Commission requirements — 1,105,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 12.1%**

Per Cent Change From Previous Year

| | Total US | New Eng. | Mid. Atlan. | Cent. Ind. | West Cent. | South-east | South Cent. | Rocky Mount. | Pacific NW | Pacific SW |
|---|---|---|---|---|---|---|---|---|---|---|
| Dec. 17 | +17.1 | +11.0 | +9.6 | +25.7 | +12.2 | +18.8 | +13.3 | +12.4 | +18.7 | +12.9 |
| Dec. 10 | +16.0 | +9.7 | +8.6 | +25.3 | +12.4 | +15.5 | +12.6 | +13.8 | +19.1 | +12.7 |
| Dec. 3 | +18.2 | +9.3 | +10.9 | +28.6 | +14.7 | +19.4 | +14.0 | +13.9 | +18.9 | +10.9 |

Seasonally Adjusted Index 211.5 Week Ago 210.9 Year Ago 180.5

**Issue's Highlights**—Edison Electric Institute selects Edwin Vennard, president of Middle West Service Co, as new managing director to succeed Col Howard S. Bennion . . . EEI Pres Harllee Branch sees growth ahead for electric utility industry . . . Major electric manufacturing companies predict good business year for 1956 . . . A $1 million adequate wiring promotion program has been approved by EEI directors for 1956.

**Priest Rapids Contracts**—Grant County PUD has disclosed unique details of proposed power sales contracts by which it expects to finance $349-million Priest Rapids hydro project on Columbia River. Prospective purchasers will be granted percentage of project's entire capacity, rather than given number of kilowatts, with price determined by same percentage of project's total cost. Price is estimated at $20 a kw-yr during bond payment period of about 35 years and $3.91 a kw-yr thereafter with delivery at the dam.

**Another Reactor Proposal**—Washington State Power Commission is considering submission of bid to AEC for 30,000-kw, $15-million atomic power reactor. To be financed by sale of revenue bonds, unit will be first of its kind and will use molten bismuth as the heat exchanger, according to commission.

**Shiloh Plays Santa**—Shiloh (Ohio) Board of Public Affairs, which purchases electricity from Ohio Power, has given its 265 electric consumers a month's free electricity as a Christmas gift.

**Rate & Regulatory News**—Nevada PSC has authorized Southern Nevada Power to up electric rates $875,630 (15%) a year . . . North Carolina Supreme Court has ruled that eight municipalities failed to prove that state commission order allowing rate increase for Virginia E&P was unreasonable, unlawful, and discriminatory . . . Sparks, Nev., city council has imposed 5% tax on annual gross revenues of all utilities in city . . . Union Light, Heat & Power and East Kentucky Rural Electric Co-op have signed pact ending disagreement over power development and service.

## NEWS OF THE INDUSTRY BRIEFLY TOLD

**Washington Wire**—Three-man Senate subcommittee headed by Sen Wayne Morse (D-Ore.,) has asked Potomac Electric Power to choose another site for its proposed 300,000-kw steam power plant on Potomac River in northern Virginia. Chosen site will block Corps of Engineers' plan for Washington-area water dam . . . FPC has allowed 18 manufacturers, six Massachusetts towns, and Hampden County to intervene in application by Electric Power, Inc for proposed 60,000-kw Enfield Rapids hydro project on Connecticut River. Intervenors say project would cause water damage in their areas.

**Labor**—Justice Department last week filed petition before Subversive Activities Control Board to have UE-IND legally branded as "Communist-dominated." Commenting on action, Westinghouse said "so long as UE remains NRLB certified union at some Westinghouse plants the company is required to bargain with this union, and this it will continue doing in good faith" . . . Meanwhile, there was no progress reported in strike settlement at Westinghouse. Back-to-work movement continued to grow at rate of 200 a day, and over 13,000 strikers accepted company's offer of $100 Christmas loan. About 16,000 employees will receive vacation pay Dec. 28.

**Merger Completed**—Pennsylvania PUC has given final approval to merger of Scranton Electric into Pennsylvania P&L, subject to 30 days for filing objections. Merger is expected to save $4-million investment and $600,000 annual operating expenses, said Pres C. E. Oakes. Scranton objections to rate increase from imposing PP&L system rates was overcome by PUC agreement to retain Scranton service area as separate division for rates and accounting.

**Appliances and Loads**—NEMA estimates of total industry major appliance sales for 1955 show following percentage increases over 1954; refrigerators, 11.8%; ranges, 18.5%; water heaters, 12.5%; farm and home freezers, 11.1%; dishwashers, 37.2%; food waste disposers, 30.0%; and dehumidifiers, 21.1% . . . Long Island Lighting estimates Christmas lighting represents 5% of winter peak.

**Construction News**—Boston Edison Vice Pres Thomas H. Carens said last week electric utilities within 25-mi radius of Boston will spend about $40 million on expansion in 1956, plans now on drawing boards contemplate spending another $200 million . . . Indianapolis P&L plans $14.4 million generating unit addition to Harding Street plant.

## ABOUT PEOPLE IN THE INDUSTRY

**Is U. S. doing a good job of developing peaceful uses of atomic energy?** Joint Committee on Atomic Energy hopes to find out. Early in coming session of Congress it hopes to be able to define the "whole scope of the peacetime uses of atomic energy as they will affect American society and economy," according to Sen Clinton P. Anderson, joint committee chairman. Decrying present secrecy, he says, "It is easier for a camel to pass through the eye of a needle than it is for a businessman to receive frank . . . answers from AEC."

**Perhaps most important outcome of Dixon-Yates** controversy has been its educational aspects, Middle South Utilities Pres Edgar Dixon told Boston Security Analysts. Many people "learned for first time TVA pays no interest on its appropriations; that it pays no federal taxes and only nominal state and local tax equivalents; that TVA's steam capacity soon will be more than twice its hydro capacity; and that TVA no longer is a social experiment, but a huge, government-owned, electric power system . . ."

**More News About People page 130**

# EEI Appoints Edwin Vennard Managing Director

Edwin Vennard, president of Middle West Service Co, Chicago, has been selected as the new managing director of the Edison Electric Institute.

The appointment, announced by EEI President Harllee Branch, was made by the Institute's board of directors and will become effective upon the retirement of Col Howard S. Bennion on June 1.

Vennard will join the Institute about March 1 as a vice president.

### A Leading Consultant

One of the most widely known executives in the electric utility industry, Vennard has been president of Middle West Service since 1953. As an executive of that company for nearly 20 years, he has been a leading consultant on public utility economics, new business, rates, and public and employee relations.

Always active in helping to strengthen public relations for his industry, Vennard has long been a leader in the Electrical Companies Advertising Program and has staunchly assisted and supported the Electric Companies Public Information Program.

Often on radio and television Vennard has argued the case for private power. Most recently he participated in a radio debate with Sen Albert F. Gore (D-Tenn.).

Last October he appeared on the Pittsburgh (Pa.) educational television station with Leland Olds, former Federal Power Commission chairman. They debated the topic, "Our Best Interest: Public or Private Power?" The program is scheduled to be screened over all of the nation's 18 educational TV stations.

The Middle West Service president also has appeared on Bob Considine's TV show in Washington. He replied to an earlier broadcast on which a Tennessee Valley Authority proponent had been heard.

### Active Commercial Interests

In addition to his public relations role, Vennard has a continuing interest in the commercial end of the industry where he began his utility career.

Last February his company arranged a two-day meeting of utility and manufacturing representatives to consider how the rate of return on investment could be increased. Vennard led the sessions and presented speakers from Continental National Bank & Trust Co, Opinion Research Corp, Westinghouse Electric Corp, General Electric Co, and his own staff.

Before joining the Middle West organization in the middle 1930's, Vennard worked for a year in General Electric Co's testing department and later for Gulf States Utilities Co. His next position was that of general commercial manager in charge of sales and rates for Southwestern Gas & Electric Co, Shreveport, La., from 1927 to 1933.

### Role in Trade Associations

Prominent in trade association activities for many years, Vennard has been chairman of the Commercial Division of EEI from 1942 to 1944, of the Modern Kitchen Bureau in 1942, and of the Sales Executives' Conference in 1950.

The utility president has also coauthored a high school text—The American Economic System—which has won four honor awards from Freedoms Foundations. He has received two additional Foundation awards for his speeches.

Born in New Orleans in 1902, Vennard graduated in engineering from Tulane University. His wife is the former Alyce Richard of Lake Charles, La. They have two daughters—Katherine, now attending the University of California in Berkeley, and Barbara, a senior at New Trier Township High School, Winnetka, Ill.

# Branch Notes Industry's Stride in '55

**. . . and foresees continued growth with size doubling every ten years; following statistics are quoted to point up advance:**

- **Generation totals 545-billion kwhr with 73 billion added in '55**
- **Sales total 479-billion kwhr; a 68-billion increase over 1954**
- **Atomic power plans will provide 900,000-kw capability**
- **Plant, property investment more than $30-billion at year end**

EEI PRES HARLLEE BRANCH

**Capital Expenditures Investor Owned Electric Utilities**

| | 1955 Expenditures | 1956 Budget |
|---|---|---|
| Fuel | $ 991,615,000 | $ 938,255,000 |
| Hydro | $ 72,150,000 | $ 112,560,000 |
| Transmission | $ 433,855,000 | $ 495,545,000 |
| Distribution | $1,093,315,000 | $1,187,295,000 |
| Miscellaneous | $ 128,040,000 | $ 171,635,000 |
| Total | $2,718,975,000 | $2,905,290,000 |

Indications are that the electric industry will henceforth exceed its past record of approximately doubling in size every ten years, Harllee Branch, president of Edison Electric Institute, said in his year-end review.

Branch, who is also president of Georgia Power Co, pointed to some superlative statistics as milestones of the industry's advance through 1955. His statement reads as follows:

### Milestones for the Year

"Generation by all components of the electric utility industry totaled 545-billion kwhr, an increase of 73 billion over 1954. Electricity sales totaled 479-billion kwhr, up 68 billion over 1954. Percentage-wise, the increases were 15.5% for generation and 16.6% for sales. In both cases quantity and percentage increases were the highest for any postwar year.

"Generating capability reached 120-million kw by the end of the year. The 12.5 million added during 1955 broke all annual installation records and brought generating capability up 11.6% over 1954.

"In addition to generation by the electric utility industry, another 78-billion kwhr were produced by industrial and railway plants bringing the grand total to 623-billion kwhr generated in the U.S., an amount representing better than 40% of all electricity produced on the globe.

"Striking gains were also made for the decade as a whole:

- "The ten-year increase in generation for the industry alone was 323-billion kwhr over 1945, or 145% in the ten-year period.
- "The ten-year sales increase was 285 billion, a 147% increase over 1945.
- "The ten-year net increase in generating capability was 70-million kw, a 140% increase over the total 1945 capability.

### Generating Capability Upped

"Of the 12.5-million kw of generating capability added during 1955, the investor-owned companies installed 8.1-million kw. The federal government installed 3.7-million kw and the remainder by local governmental agencies and cooperatives.

"During the next ten years it is estimated that an additional 95- to 112-million kw will be added to the present total. Of the 28-million kw, presently scheduled, 22 million is planned by the investor-owned companies and 3.5 million by the government.

"Gross margin between generating capability and peak power demand in 1955 was 20.7-million kw or 20.8% for the country as a whole, as compared with 18.8-million kw or 21.2% in 1954. Growth in December peak demand was 12% as compared with 9.2% in 1954 and 7.6% in 1953.

### Atomic Power Plans Laid

"Since the start in September 1954 of construction on the Shippingport, Pa., atomic power plant by Duquesne Light Co, investor-owned companies have made definite plans to construct five additional nuclear power plants.

"These plants, with the Duquesne installation, will have total capability of approximately 900,000 kw and will be built at a cost to the companies of over $225 million. Completion of these plants is expected between 1959 and 1962.

### Investment Hits $30 Billion

"Investment in plant and property of the electric companies exceeded $30 billion at the end of 1955. At the beginning of the decade it was less than $12.5 billion.

"Construction expenditures by the investor-owned electric companies in 1955 totaled $2,750,000,000 as compared with the $2,835,000,000 expended in 1954. Expenditures during the past decade have averaged $2.1 billion per year, with approximately

(*Continued on page 55*)

# 3 Manufacturing Presidents Predict

## GE's Pres R. J. Cordiner

With sales billed in the first 9 months of 1955 up 4% over 1954, General Electric Co President Ralph J. Cordiner saw prospects of ending the year about even with the record $3.128 billion level set in 1953. To do this GE would have to show an increase of 5 to 6% over the $2.959 billion level of 1954.

Behind these figures is a slippage in defense business in 1955 of about $500 million which was more than made up by increases in normal business, Cordiner pointed out at his year-end press conference.

In 1956 new business will top 1955 by 10 to 15%, he predicted, with the increase divided across the board among large apparatus, industrial products, consumer products, and electronics. Cordiner foresaw little change in defense business but said the biggest increase will come in consumer products where business will run well ahead of the company as a whole, percentage wise.

Company earnings rose to a new peak in the first 9 months of 1955 and should pace the record for the whole year. Cordiner attributed the gain to the company's increased ratio of commercial to defense business.

Shifting to a discussion of the national economy, Cordiner said business generally should show an increase of 4 to 6% next year. National economy will be paced more by the shortage of materials, such as steel, copper, and aluminum than by a shortage of either labor or capital. "Steel and aluminum producers are up to capacity now," he observed, "and expansion programs will not provide for needed capacities until 1958."

With unemployment currently only 4% of the work force—as low as at the wartime production peak—Cordiner foresaw a tighter labor supply situation ahead—on a long term basis. "With an increase in labor force of only 11 to 12% between now and 1965, labor is increasing at a slower rate than economic activity generally. Unless industry turns to automation, it will not meet demands," he said.

Returning to discussion of electrical industry activity, Cordiner said GE holds a greater backlog of orders from utilities today than at this time last year. In 1956 and 1957 a very excellent volume of sales is in prospect.

## Westinghouse's Pres G. A. Price

Unprecedented expansion of facilities for research and development highlighted Westinghouse Electric Corp operations in 1955. The year saw completion of the $296-million expansion program begun in 1951 with six major new facilities placed in operation or under way.

In reviewing Westinghouse accomplishments at year end, Gwilym A. Price, chairman and president, observed that the strike at company plants begun on Oct. 17 of this year, has naturally had a disruptive effect on the company's operations. However, with the resumption of normal operations, he looks forward to an increasing contribution to earnings from these facilities.

Included among the six major new facilities described by Price were:

- New multi-million dollar research laboratories near Pittsburgh.
- One of the industry's most modern facilities for the development of new metal alloys and metallurgical techniques at Blairsville, Pa.
- The steam division in South Philadelphia, including a research and development laboratory, was expanded.
- Construction of a $12.5-million jet research and development center at Kansas City was begun.
- Also started was a $7-million expansion of the military electronics operations.
- Now nearing completion at Sharon, Pa., is a new sound laboratory for the development and testing of improved transformers.

Sales and earnings were adversely affected during the year by diminished backlogs of orders for heavy apparatus resulting from a decline in new orders in 1953 and 1954; cancellations of orders for defense products; heavy expenditures to get production under way in new plants; high cost of rapid amortization of new facilities; and, most serious of all, production lost through strikes and work stoppages.

Although price competition was severe, new orders for heavy apparatus booked in 1955 showed a gain over 1954 and the backlog of orders is now well above the level prevailing at the beginning of 1955. In defense products also, Price said, the backlog of orders is again building up.

Despite the many difficulties faced, Price saw every evidence that Westinghouse is making a recovery and that performance for 1955, while below that of 1954, would be creditable.

# Good Business Year Ahead in 1956

## A-C's Pres R. S. Stevenson

The prediction that sales of apparatus and equipment to electric light and power companies by the Allis-Chalmers Manufacturing Co during 1956 will approximate levels of business booked during 1955 marked the year-end statement by Robert S. Stevenson, president.

Total sales for Allis-Chalmers, Stevenson said, will establish an all-time record in 1955. Orders received during the current year have been substantially above those entered during 1954, and there has been a steady growth in the company's backlog of orders, this year.

Because of lower orders placed by utility companies for heavy apparatus in 1953 and 1954, shipments of this type of equipment were off somewhat in 1955. The same condition will prevail during much of 1956, Stevenson observed, but orders already on the books for such heavy apparatus assure satisfactory operation level in 1957.

In all of the other fields through which we serve the electric utility industry and its customers, we expect a steady volume of business—and it appears, from what we know now, that our overall 1956 sales record should be equal to that of 1955.

## Branch Marks Advance in '55, Sees Growth Ahead

**. . . as stockholder ownership spreads, industrial kwhr sales up 23.8% in past year, gross revenues climb 9.6% over 1954 level**

64% of the funds provided by new capital and the remainder from internal funds.

"Construction expenditures over the next ten years are expected to be more than 50% greater than in the past decade with an average of over $3 billion a year, ranging upward from the current rate to about $4 billion a year by the end of the period.

### Industry Ownership Spreads

"Ownership of the electric industry continued its spread in 1955 Stockholders alone are now computed to be around 3.7 million, while those with indirect financial interest in electric company operations represent nearly the whole of American life. The 93-million life insurance policyholders and the more than 20.5-million depositors in mutual savings banks are examples of such indirect ownership. . . .

### Energy Sales on Increase

"Of the 479-billion kwhr sold in 1955, sales to industrial customers totaled 247.8-billion kwhr, a 25.8% increase over 1954. A substantial part of the industrial increase was due to sales for atomic energy purposes. Residential sales were 120.5-billion kwhr, an 11.1% increase, and sales to commercial customers were 80.5-billion kwhr, a 9.7% increase. Sales to other customer categories totaled 30.2-billion kwhr.

### Service in Reach of Almost All

"Customers totaled 52.6-million at the end of 1955. The increase was 1.4-million over 1954. The number of customers increased 55% over the ten-year period, with the greatest annual increase in number of customers occurring during first half of decade.

"For several years electricity has been in reach of nearly every American home, with over 98% of occupied homes, urban and rural, now connected for service.

### Increase in Household Use

"The steadily increasing popularization of major electrical appliances, the almost universal use of promotional rate schedules, and, in recent years particularly, the rapid expansion of home air conditioning have been important factors in the phenomenal annual increases in household use of electricity.

"Average use of electricity per domestic customer in the United States totaled 2,755 kwhr in 1955, an increase of 206 kwhr over the 1954 average. The ten-year average annual increase in use was 152.6 kwhr, as compared with 55 kwhr in the preceding decade. The ten-year increase was 124%.

"In a decade of advancing costs, prices and incomes, the average revenue per kwhr sold to domestic customers dropped from 3.41¢ per unit in 1945 to 2.64¢ in 1955, a 22.6% decrease in the ten-year period. The 1954 average revenue was 2.69¢ per kwhr.

"This apparently unique price-per-unit record was made in the face of fairly general but modest rate increases and resulted mainly from expanding consumption of electricity by the domestic consumer and the promotional character of rate schedules", Branch said.

### *Index Coming Up*

**Electrical World's semi-annual index for July-December 1955 is now in preparation and will be included with one of the January issues.**

# EEI Starts Wiring Program

**"Housepower" to theme million-dollar-plus promotion, publicity campaign. National wiring contest scheduled for May**

Plans for a national wiring publicity and promotional program which could result in an industry expenditure of well over $1 million in 1956 were approved Dec. 15 by Edison Electric Institute's Board of Directors.

To carry the theme, "Housepower," the program will be directed specifically towards the rewiring of existing homes, according to O. Rodney Doerr, chairman of EEI's Commercial Committee. It follows a series of preliminary studies of the home wiring market made by the Institute and other segments of the industry.

The "Housepower" program, as outlined by Doerr, will consist of:

1—A national campaign backed by the utility industry and other electrical industry groups who will tie in with national advertising and publicity.

2—Local activities by individual utility companies and their trade allies.

"Actually, when you take into account local expenditures, the program should amount to several million dollars," he said.

One of the program's first projects will be a wiring question and answer contest conducted by a national shelter magazine scheduled to begin in May.

The "Housepower" theme will be carried throughout the program. "We think the term is a natural," Doerr said. "It connotes first of all the demand by the home for good service and proper wiring for modern living. But it goes further than just wiring. It connotes as well that a home to have full 'Housepower' must have a full compliment of electrical servants.

Doerr emphasized that the program is designed to augment the work of the National Adequate Wiring Bureau and individual utility companies in their areas. "It is in no way meant to replace their work," he said.

Program was developed by Fuller & Smith & Ross, Inc, advertising agency. Full details will be announced later.

## 2 Westinghouse Pickets Arrested

In a picket-line flare-up at Westinghouse Electric Corp's Lamp Division in Trenton, N. J., (above) police arrested two union leaders who tried to prevent two workers, a local representative of CIO International Union of Electrical Workers, and a Central Jersey CIO Council representative, from entering the plant.

But during third week of a back-to-work movement at eight of the company's striking plants, about 1,000 more hourly rated employees returned to their jobs despite picket lines, bringing the total to 2,950.

The same day on which the company offered a $100 pay advance to 17,000 Pittsburgh strikers as a Christmas gesture, Westinghouse declined to submit strike issues to arbitration as proposed by the governors of Pennsylvania, New York, and Maryland. The company, in rejecting the proposal, said, "Because of our obligations to stockholders, we cannot delegate to a third party a decision which would affect the competitive standing of our company for at least the next five years."

## National Electrical Week Set for Early February

National Electrical Week, observed by a few states last year, will be celebrated annually during the second week in February starting next year. Announcement of the observance was made recently at a meeting in New York City of representatives from eight national electrical associations.

Purpose of the annual occasion, which coincides with Thomas A Edison's birthday week, is to "focus attention on the contributions of electricity to our American way of life and on the contributions made toward the economic strength of our country by the organizations making up the electrical industry."

This statement of purpose was contained in a resolution recommended for adoption by the participants.

Groups participating in the observance, initiated in 1953 by International Association of Electrical Inspectors, are Air Conditioning and Refrigeration Institute, Edison Electric Institute, International Association of Electrical Leagues, National Appliance and Radio-TV Dealers Association, National Association of Electrical Distributors, National Electrical Contractors Association, National Electrical Manufacturers Association, and IAEI.

Chairman of the newly formed National Electrical Week Committee is M. E. Skinner, vice president of Union Electric Co of Mo. Other officers of committee, composed of representatives of eight participating organizations, are: IAEI President Col S. R. Todd, vice chairman; and EEI Commercial Director J. T. Coatsworth, temporary chairman.

AMONG FIGURES AT WORKSHOP'S GENERAL SESSION: EDWIN VENNARD, FRED STRONG, R. W. McCLURE, J. P. MADGETT

# Companies, Co-ops Pool Sales Efforts

**SALES**
Rural

**With $24-billion farm market to shoot at, they show signs of cooperating at 2nd Inter-Industry Power Use Workshop**

Twenty-four billion dollars worth of electric appliances and equipment. That is what the Rural Electrification Administration estimates American farmers will buy in the next 20 years.

With this market information in hand, the Inter-Industry Farm Electric Utilization Council late last month swung into its 2nd Annual Power Use Workshop. Purpose: To gird up the forces who must perform this vast selling job.

Coordination appeared to be the key. Meeting in St. Louis, some 600 farm sales specialists from electric companies, rural co-ops, manufacturing firms, education and government agencies heard repeated appeals for cooperation in their selling efforts.

### Mutual Benefits

One of the most forceful came from the leader of a rural electric cooperative. John P. Madgett, general manager of the Dairyland Power Cooperative, La Crosse, Wis., largest REA-financed unit in the country, said the farmer and power suppliers alike will realize full benefits of rural electrification only if the right kind of integrated marketing plans are brought into play. Citing importance and feasibility of co-op-power company cooperation, he said his own organization by making system integration arrangements with neighboring power companies has been able to hold down its investment and operating costs and hence give its customers a better power bargain.

But saleswise, we all have a long way to go, he said. "Only 20 to 30% of all rural power sold is used for barn lighting and outside equipment operations."

What these sales can be is further amplified by the REA's $24 billion,

(*Continued on page* 108)

**Estimated Farm Purchases of Electrical Equipment By States and by Periods, 1956-1965**

*(Millions of Dollars)*

| States | 1956–60 | 1961–65 | States | 1956–60 | 1961–65 |
|---|---|---|---|---|---|
| Alabama | 169 | 191 | Nevada | 9 | 11 |
| Arizona | 7 | 8 | New Hampshire | 10 | 11 |
| Arkansas | 86 | 97 | New Jersey | 44 | 50 |
| California | 297 | 335 | New Mexico | 9 | 10 |
| Colorado | 54 | 60 | New York | 152 | 173 |
| Connecticut | 21 | 24 | North Carolina | 222 | 250 |
| Delaware | 7 | 8 | North Dakota | 76 | 86 |
| Florida | 48 | 54 | Ohio | 270 | 306 |
| Georgia | 159 | 179 | Oklahoma | 73 | 82 |
| Idaho | 68 | 77 | Oregon | 155 | 174 |
| Illinois | 194 | 220 | Pennsylvania | 189 | 214 |
| Indiana | 194 | 220 | Rhode Island | 3 | 4 |
| Iowa | 278 | 316 | South Carolina | 97 | 109 |
| Kansas | 109 | 124 | South Dakota | 72 | 81 |
| Kentucky | 180 | 202 | Tennessee | 284 | 321 |
| Louisiana | 57 | 65 | Texas | 179 | 204 |
| Maine | 11 | 13 | Utah | 24 | 28 |
| Maryland | 28 | 32 | Vermont | 19 | 22 |
| Massachusetts | 25 | 28 | Virginia | 115 | 130 |
| Michigan | 158 | 178 | Washington | 200 | 226 |
| Minnesota | 239 | 270 | West Virginia | 36 | 41 |
| Mississippi | 121 | 137 | Wisconsin | 241 | 272 |
| Missouri | 146 | 164 | Wyoming | 17 | 19 |
| Montana | 55 | 63 | | | |
| Nebraska | 133 | 150 | U. S. Total | $5,340 | $6,039 |

BEFORE REDESIGN work the JCP&L office interior looked like this. Problems included awkward "L" shaped floor, massive structural columns, and low budget

R. B. Cole of JCP&L, who planned new lighting, shows new floor plan design

# Utility Sets Modern Lighting Example

SALES
Commercial

**Jersey Central P&L redesigns office to provide modern facilities for customers and show them the value of planned lighting**

Jersey Central Power & Light Co has turned its main commercial office at Asbury Park, N. J., into a demonstration of the value of good lighting.

When the company decided that it should redesign the office to provide the best in customer accommodation, planned lighting played a major role. Here was a challenge and a real opportunity, the company felt, to show the public how lighting techniques could be used as part of the decorating scheme to enhance the beauty of the architecture while at the same time providing definite functional lighting for each seeing requirement throughout the commercial office.

These were the initial problems:

- Awkward "L" shaped floor plan.
- Four massive structural columns.
- Floor plan had to be divided into seven distinct areas.
- To direct traffic flow through the medium of lighting.
- Air conditioning, ducts, wiring, and steam pipes also had to be concealed in the most economical fashion.
- To create an effect as modern as tomorrow by a marriage of planned lighting and contemporary architecture.
- To set a lighting example for customers which would be a practical demonstration of the advantages and possibilities of planned lighting.
- A limited budget.

This is how the company treated the various redecorating aspects:

**Foyer**—A warm and friendly atmosphere was created through the use of a modernistic brass carousel luminaire. Three brass torpedo units housing 150-w par 38 spotlamps were used to highlight a 5-ft "Reddy Kilowatt."

**Display**—As the customers enter, they are directed past the merchandise which is illuminated by ceiling-mounted, 430MA slimline units, on 6-ft centers, equipped with plastic side panels and grate-lite louver bottoms which blend in with the grate-lite ceiling. Each unit houses four 75-w, 96-in. T-12 standard cool white lamps. Swivel spotlight section is mounted on both ends of each unit for accent lighting. The fixtures are arranged to influence the traffic flow in the direction of the cash counter.

**Cash receiving**—In the cash receiving area, a free form grate-lite drop ceiling was designed to break up the office's harsh rectangular look and to help make this section the focal point. The grate-lite ceiling enabled the designer to harmonize the lighting with the architectural free form. It also served to create a mood of outdoor spaciousness. The delicate ⅜-in. cube, constructed of Guth Gratelite ceiling, imparted to the surface a "floating in air" look. This low brightness material enabled the company to provide 90 ftc of general illumination with complete eye comfort.

In back of the cash counter are

AFTER REDESIGN. FREE FORM GRATE-LITE WAS DESIGNED TO BREAK UP HARSH RECTANGULAR LOOK OF OFFICE

shadow boxes illuminated by 15 MM neon tubes, denoting four phases of the company's operations. Fluorescent lamps were placed in back of a plastic cut-out map of New Jersey to give a three-dimensional look and show the territories served by the company. This is an example of how a story can be told through the medium of lighting.

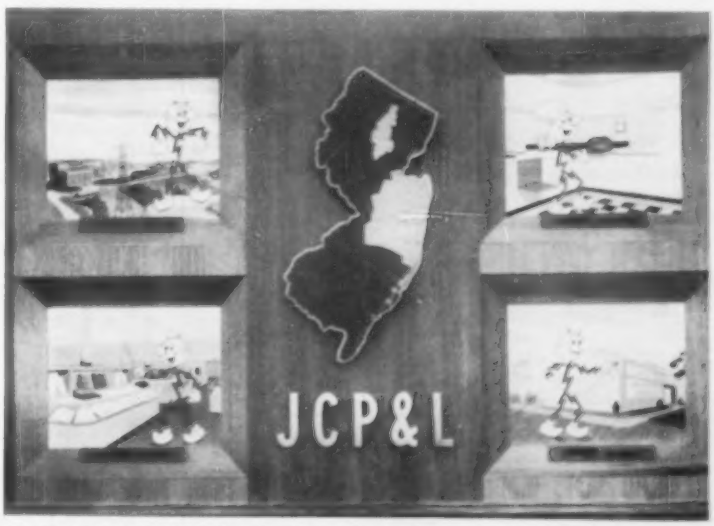
The curved face of the free form (lighting surface suspended from the ceiling) gives a definite break between public and working areas and is highlighted by two green 15MM neon tubes located in a cove at the lower edge. This decorative lighting serves to emphasize the flowing lines of the drop ceiling.

**Customer contact area** — The customer contact area is illuminated by the same type of luminaire used in the display area. Once again the fixture arrangement influenced traffic.

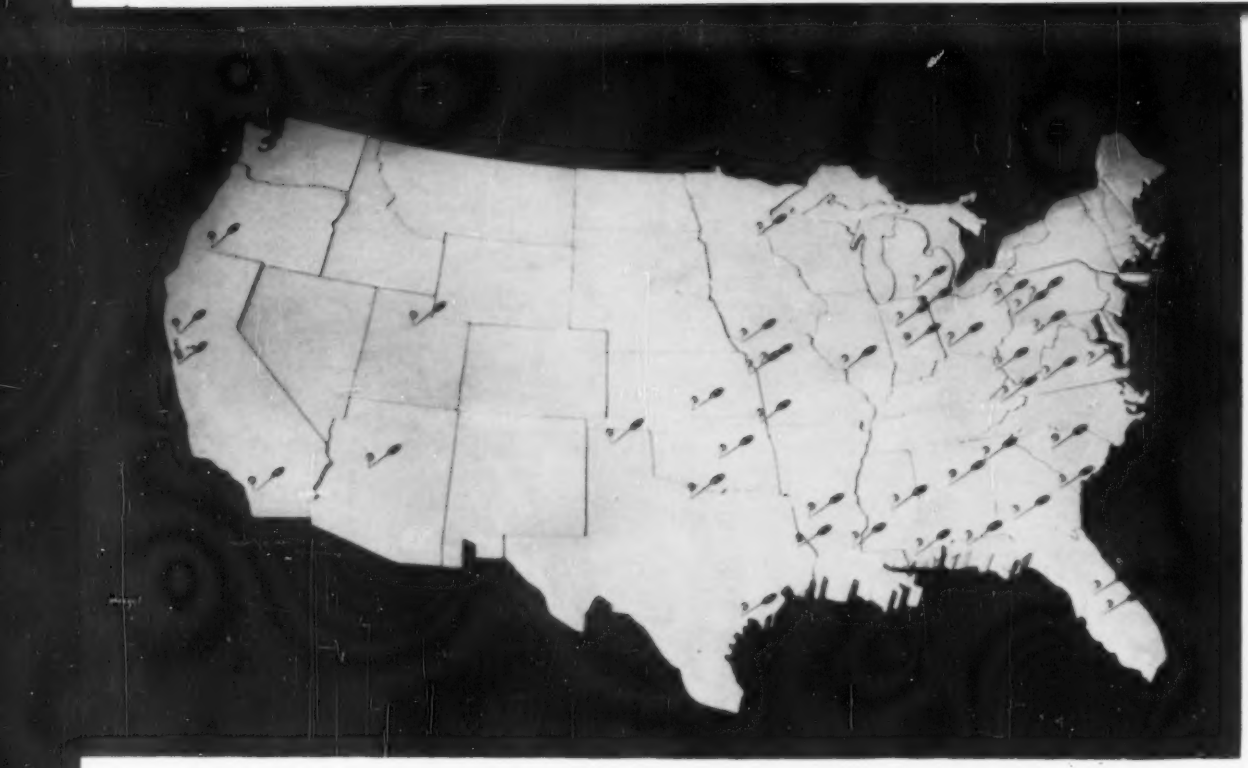
**District office manager and staff area**—This has a complete grate-lite ceiling and behind the grate-lite ceiling are continuous rows of slimline one-lamp channels on 24-in. centers, ceiling mounted. Because of architectural conditions, the installations were 4, 6, and 8-ft, 430MA fixtures, using T-12 lamps along with 6 and 8-ft 200MA units equipped with T-8 lamps.

One of the design problems was to maintain a uniform brightness on the grate-lite louver without appreciable loss in footcandles. This was a complex problem because the ducts were only 12-in. away from the louver. Mounted either along the side or the bottom of the ducts to fit prevailing conditions were 6 and 8-ft 200MA units equipped with T-8 lamps.

In order to control brightness, it was necessary to give equal consideration to all surface finishes: 1. oak paneling, finished natural; 2. desk and counter, oak natural; 3. side wall flat pastel green—light reflection 65%.




FOUR SHADOW BOXES, denoting four phases of company's operations are illuminated by neon tubes. Cut-out map is illuminated from back by fluorescents

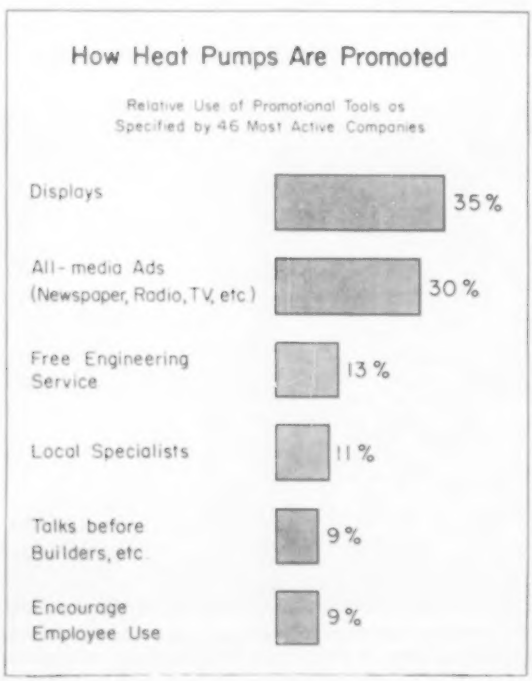


Pins Mark Location of 46 Utilities Which . . .

# Put the 'Heat' on Heat Pump Sales

**SALES**
General

**EEI survey shows 68 of 129 companies questioned promote or will promote such equipment. All utilities surveyed serve 2,622 units**




Heat pump promotion is picking up.

A survey by Edison Electric Institute last spring and released this month testifies to it with these findings:

• 129 electric companies reported 2,622 heat pump installations in service in their areas. Residential jobs accounted for 1,614, commercial 991, and industrial 17.

• Some 68 companies, or more than half of the 129 reporting, said they have heat pump promotional programs in operation or planned. Of these, 46 had definite programs underway, 16 had promotions in the planning stage, and six said they first wanted to study some experimental installations before setting up programs.

The picture most likely is even better now. The survey was made last April and data supplied was that for the end of 1954. It deals only with number of installations, not with individual units. As many installations (commercial particularly) use more than one unit, actual number of heat pumps in service is somewhat greater. In fact, one manufacturer estimates that as of Dec. 31, 1955, there will be some 8,000 individual heat pumps in operation in this country. And a number of the utilities reported sales quotas for '55 which raised the survey figures. Ten said they were "bucking" for 480 new "installations" this year, five expected 542 "units," and two said they hoped to install 3,377 "tons."

The map above shows where the survey indicated heat pump promotions are in progress. Although they made

their initial appearance in the South, heat pumps now seem to be making real headway in other parts of the nation, particularly the Midwest.

A breakdown of the survey's findings is included in the tables at right. Table I shows state by state distribution of heat pumps classified by type of customer. Table II is a breakdown by type of heat source.

In some areas where heat pump capacity was inadequate to meet heating demands at low temperatures, electric resistance elements were used in conjunction with the units. Ranging in size from 1 to 16 kw, the elements were included in 914 reported installations—about 35% of the total, excluding industrial jobs.

### How They Promoted

Promotional methods run the gamut. A sampling of detailed replies from the 46 companies actively promoting the heat pump reveals the use of all or some of these practices (See chart on previous page):

- Live exhibits and displays at fairs, shows, and on company premises.
- Newspaper, radio, TV, and direct mail advertising supporting local dealers.
- Free engineering service, particularly to builders and architects.
- Local specialists who devote major part of time to heat pump sales and service.
- Encouragement of employees to install heat pumps in their homes.
- Talks before builders, realtors, architects, civic clubs, and employee groups.

Most all companies said they worked closely with manufacturers and local dealers. But some of them turned up with imaginative selling techniques. One company offers a prospect bonus plan to its employees. Another subsidizes wiring for heat pump buyers. A third has what it calls an "off-peak, off-season promotional rate of about 1¼¢ per kwhr."

One of the most active utilities does this:

- Employs two men who devote full time to heat pump promotion and checking installations.
- Trains all sales personnel to discuss and make initial quotations on heat pump jobs.
- Uses newspaper ads plus heat pump exhibits at dealer shows, realtor shows, and in company and dealer offices.
- Arranges talks before builders, realtors, architects, civic clubs, and employee groups. (More than 25 talks reached some 1,200 people during the first four months of 1955.)
- Set a 150-unit sales quota for the year. (At time of the survey 21 units had been contracted for and ten installed while three housing projects, totaling 90 homes, planned to use heat pumps throughout.)

Not all utilities promoting went this far. The extent of promotion appeared highly variable. At the other extreme one company merely prepared an employee booklet, and another offered what it termed "general encouragement to prospects to use the heat pump."

Survey questionnaire was mailed out to commercial executives of 166 electric utilities. It was developed and carried out under the auspices of EEI's Market Research Committee, the Association of Edison Illuminating Companies—EEI Joint Heat Pump Committee, and EEI's Commercial Electric Space Heating and Air Conditioning Committee.

## Table I—Number of Heat Pump Installations

***Based on replies to 1955 EEI Heat Pump Survey***

(Data as of Dec. 31, 1954)

| State | Residential | Commercial | Total |
|---|---|---|---|
| Alabama | 82 | 59 | 141 |
| Arizona | 27 | 9 | 36 |
| Arkansas | 0 | 2 | 2 |
| California | 308 | 104 | 412 |
| Colorado | 1 | 0 | 1 |
| Connecticut | 0 | 1 | 1 |
| Dist of Columbia | 2 | 3 | 5 |
| Florida | 548 | 345 | 893 |
| Georgia | 81 | 34 | 115 |
| Idaho | 12 | 0 | 12 |
| Illinois | 12 | 4 | 16 |
| Indiana | 29 | 15 | 44 |
| Kansas | 9 | 3 | 12 |
| Kentucky | 6 | 4 | 10 |
| Louisiana | 65 | 45 | 110 |
| Maryland | 6 | 4 | 10 |
| Michigan | 4 | 3 | 7 |
| Minnesota | 1 | 0 | 1 |
| Mississippi | 19 | 22 | 41 |
| Missouri | 17 | 4 | 21 |
| New Jersey | 16 | 2 | 18 |
| New York | 3 | 3 | 6 |
| North Carolina | 15 | 28 | 43 |
| Ohio | 34 | 36 | 70 |
| Oklahoma | 5 | 20 | 25 |
| Oregon | 53 | 23 | 76 |
| Pennsylvania | 6 | 28 | 34 |
| South Carolina | 26 | 54 | 80 |
| South Dakota | 0 | 1 | 1 |
| Tennessee | 11 | 10 | 21 |
| Texas | 135 | 73 | 208 |
| Utah | 4 | 3 | 7 |
| Virginia | 41 | 37 | 78 |
| Washington | 20 | 2 | 22 |
| West Virginia | 8 | 8 | 16 |
| Wisconsin | 8 | 2 | 10 |
| TOTAL | 1614 | 991 | 2605 |

Note: Includes only installations reported by the 129 companies answering questionnaires.

## Table II—Types of Heat Pump Installations

***Based on installations with reported heat source***

(Data as of Dec. 31, 1954)

| Type of Heat Source | Number of Installations: Residential | Commercial | Total |
|---|---|---|---|
| Air | 773 | 479 | 1251 |
| Ground | 68 | 3 | 71 |
| Water | 463 | 399 | 862 |
| Total | 1304 | 881 | 2184* |

* Because not all respondents reported heat source, number of installations shown in this table is less than actual 2,605 total residential and commercial installations shown in Table I.

Note: These data indicate that air heat source type heat pumps are in greatest use and those using water not far behind. As most commercial installations are multiple units, the total number of "units" used for commercial application is greater than the number of installations shown. However, the survey was intended to determine how many electric power "customers" are using heat pumps; so the number of installations is of primary interest.

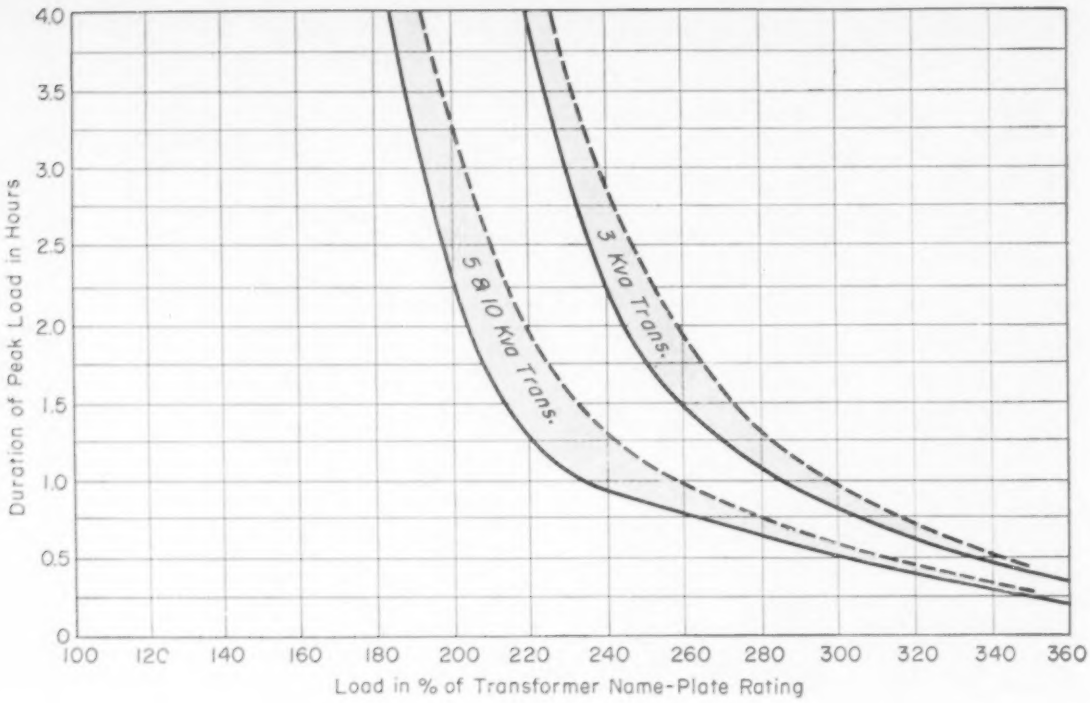



FIG. 1—LOAD LIMITS FOR TRANSFORMER WITH 50% LOAD (SOLID LINE) AND NO LOAD (DASHED LINE) BEFORE PEAK

# Tests Conserve Transformer Kva

**DISTRIBUTION**
Operation-Testing

**Checks at Consumer Power's rural customers' premises determine load characteristics and establish the sizes of units required**

**HOWARD JENSON,** Distribution Engineer, Consumers Power Co, Jackson, Mich.

Careful attention to the loading of rural distribution transformers on the Consumers Power Co system has saved hundreds of kva of connected transformer capacity. Simple rules were set up for permissible loads on transformers. Numerous studies have been made and are continuing in an effort to reduce the time-consuming and expensive tests for determining load characteristics exactly and the proper time for transformer replacements.

Based on results the following conclusions are a guide in determining need for additional transformer capacity for a farm customer.

**1.** A 5-kva transformer has capacity for three to six years of load growth, based on a 10% per year growth, and adequately serves a customer with normal household appliances and minor farm equipment, such as milk cooler, milking machine, building ventilation, dairy water heater, and fractional horsepower motors.

**2.** A minimum transformer size of 10 kva is necessary to serve a customer with normal household electric appliances and some major farm equipment, such as, brooding lamps, welder, hay drier, and silo unloader.

**3.** A minimum transformer size of 10 kva is necessary to serve more than one normal farm customer from the same transformer.

## Demand Rate Offered

The Consumers Power rate schedule includes a demand rate for farm customers whose 15-min demand exceeds 7.5 kw. Demand is checked only after a customer's energy use exceeds 1,000 kwhr per month for three successive months. Where a 15-min demand of 7.5 kw or more is recorded, a demand meter is installed permanently, and the customer is placed on the demand charge rate. This customer's transformer needs are then reviewed as past experience has indicated that additional capacity is often required.

Curves (Fig 1) determine allowable transformer loading. These loading limits are considerably above ASA recommendations, but controlled tests on a cross section of transformers on the system indicate that transformer life expectancy will not be significantly reduced by loading within the limits of these curves. Other companies may find it advisable to alter the curves in accordance with their own test results.

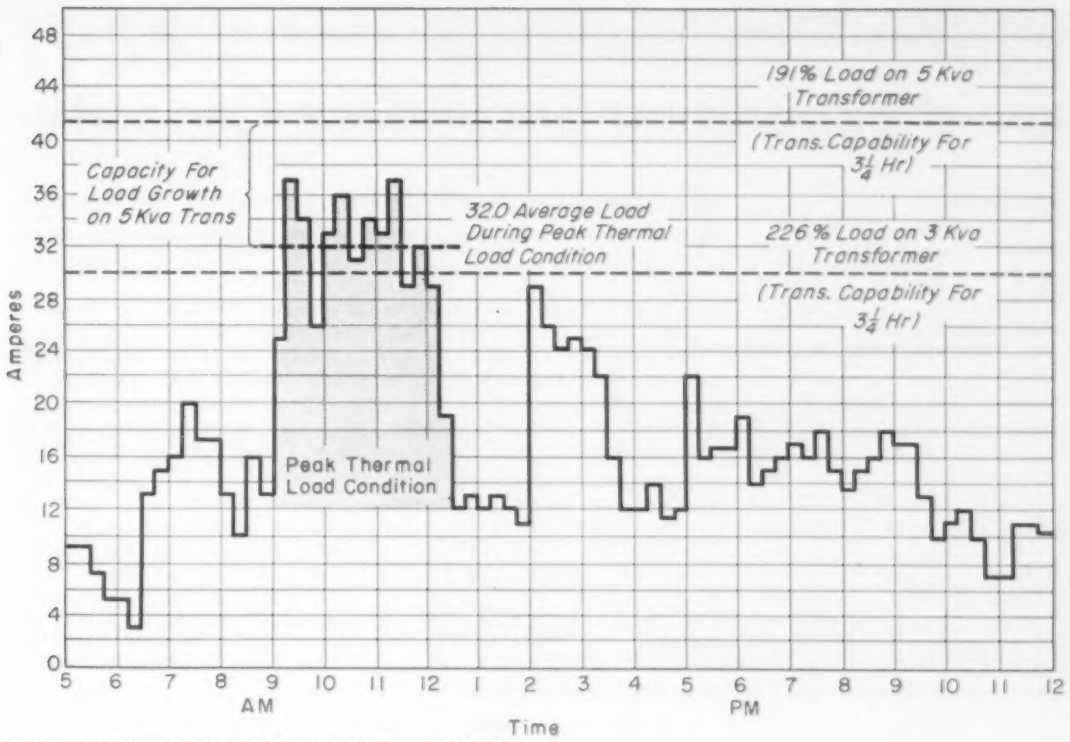

191% Load on 5 Kva Transformer
(Trans. Capability For 3¼ Hr)
Capacity For Load Growth on 5 Kva Trans
32.0 Average Load During Peak Thermal Load Condition
226% Load on 3 Kva Transformer
(Trans. Capability For 3¼ Hr)
Peak Thermal Load Condition
Amperes
Time
AM
PM

FIG 2—EQUIPMENT CONSIDERED IN TEST WAS AS FOLLOWS:

| Quantity | Electrical Equipment | Quantity | Electrical Equipment |
|---|---|---|---|
| 2 | Clocks | 1 | Sewing machine |
| 1 | Clothes dryer | 21 in. | Television set |
| 2 | Fans | 1 | Toaster |
| 20 cu ft | Food freezer | 1 | Vacuum cleaner (tank) |
| 1 | Iron | 1 | Washing machine (auto) |
| 8 rooms | House lighting | 52 gal | Water heater |
| 1 | Mixer | 1000 W | Brooding |
| 1 | Oil furnace | 1 | Farm shop (fractional hp motors) |
| 2 | Radios | ½ hp | Water pump |
| 1 | Range | 1 | Furnace blower |
| 1 | Refrigerator | ½ hp | Cement mixer |
| 1 | Roaster | 2 | Electric razors |
| 1 | Sandwich grill | | |

In about 80% of the 3-kva transformer replacements, the unit installed is 5 kva. The replacement of a 3 with a 10 kva transformer, once usual practice, is now unusual. This is possible only because of the close attention given customer loads, load characteristics, and transformer sizes.

The band width on the chart indicates variation in permissible loading, depending upon the load carried by the transformer for several hours before peak-load condition. The solid line is used when the transformer has been carrying 50% load several hours prior to the peak load condition, and the dashed line when the transformer has been carrying no load for several hours preceding peak-load condition. For all transformers tested it was necessary to use the solid line.

### Daily Load Curves Made

To apply Fig 1, the daily load curves of groups of farm customers with similar electric equipment were recorded over a two-week period, and results were compared. Where there was a major electrical device, arrangements were made to have the test period include its normal operation.

An example illustrates the method used to determine customer load characteristics and transformer capacity requirements. The peak-day load curve of a farm customer having the normal household appliances and minor farm equipment is shown in Fig 2.

The peak thermal load condition was determined by comparing actual load-duration conditions with the transformer capability curves in Fig 1. The peak load-duration condition is recorded in Fig 2 as the peak thermal load condition. This is represented by the shaded area, the heavy dashed line showing an average load of 32 amp for 3 hr and 15 min.

The load is compared with the load

(Continued on page 135)

Promoting Primary and High-Tension Services Makes It Possible to . . .

# Avoid Expanding Secondary Capacity

**DISTRIBUTION** Design

**Both Philadelphia Electric Co and its customers find it profitable to agree on high-voltage distribution and wholesale rates**

C. E. NELSON, Superintendent, Engineering Div., Transmission & Distribution Dept., Philadelphia Electric Co., Philadelphia, Pa.

Promoting primary service for customers of 50 kva demand, and high-tension service for those above 400 kva, has enabled Philadelphia Electric Co to avoid costly and difficult expansion of secondary capacity in the congested business areas it serves.

Load growth of 130,000 kva since 1930 in downtown Philadelphia has required adding only 18,900 kva of transformers in the low-voltage network, a 45% increase. Converting 316 customers to primary or high tension service has supplied 83% of the growth, or 108,000 kva. Impetus for this achievement has been the differential introduced in wholesale rates between 1930 and 1936.

Advantages to the customer are many. Savings from purchase of energy at wholesale rates amortize his investment in transformers, service equipment, and wiring in a reasonable period. He can establish load centers at locations in his plant selected for economy and supply large motors at primary or high tension voltage. And he can choose 265/460Y or any other utilization voltage that fits his particular needs.

### *Downtown Business Growth Taken on High-Voltage Service

| | 1930 | 1954† |
|---|---|---|
| **Primary Customers** (2.4 kv) | | |
| With single service | 36 | 273 |
| With dual services | 61 | 110 |
| Total | 97 | 383 |
| Coincident demand, kva | 26,839 | 80,324 |
| **High-Tension Customers** (13.2 kv) | | |
| With single service | 1 | 7 |
| With dual services | 10 | 34 |
| Total | 11 | 41 |
| Coincident demand, kva | 13,050 | 67,800 |
| **Network Customers** (120 & 240 v) | | |
| Coincident demand, kva | 27,602 | 48,960 |
| Transformer capacity, kva | 41,900 | 60,800 |
| **Total Area** | | |
| Coincident demand, kva | 67,491 | 197,084 |

*1.4 sq mi area †Latest figures available

### High-Voltage Growth Is System Wide

| | 1930 | 1954 |
|---|---|---|
| **System Peak Load, Mw** | 672 | 2,000 |
| **Primary Customers** (2.4 & 4 kv) | | |
| Number | 404 | 2,371 |
| Total non-coincident demand, Mva | 99.4 | 458.1 |
| **High-Tension Customers ‡(13.2, 33 & 66 Kv)** | | |
| Number | 104 | 372 |
| Total non-coincident demand, Mva | 125.2 | 729.7 |

‡Does not include railroad or transit loads.

### Utility Benefits in Many Ways

The utility also has benefitted from extensive acceptance of this high-voltage policy. Service to these customers requires only metering installations on their property, along with extensions of primary and high tension cable to serve them. Construction and maintenance of many substations on customer property have been avoided, along with undesirable features of such installations. Duplication in reserve stocks of transformers to maintain systems of various higher secondary voltages has been eliminated.

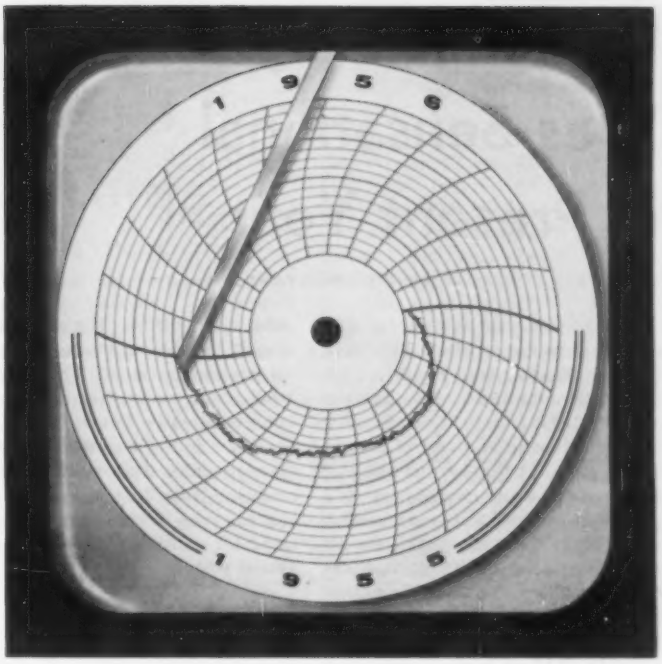
### Service Congestion Is Avoided

Congestion of duct facilities in underground areas by duplication of underground mains or of pole facilities in overhead areas has been minimized. It has not been necessary to risk customer and municipal objections to establishing numerous new transformer manholes or to overcome the construction problems incident to placing them among congested subsurface facilities.

### Expansion Is Less Costly

The utility also has been able to handle its rapid expansion with less need to add construction and maintenance personnel during periods of critical supply and high costs. Although no exact figures are available, there is no doubt that the savings have been considerable.

# 1955 Year-End Review and Predictions for 1956




## A Special Report by the Editors

In the 15 pages that follow, the editors of Electrical World present a summary of the outstanding developments and accomplishments of the industry during the year which is passing and their predictions for 1956.

This annual review-forecast section gives all of us in the industry an opportunity to take inventory and plan for the future. In these pages you will find our best thinking on the questions: What has the industry accomplished in 1955? What will it do in 1956?

The forecasts are realistic. They are based on and closely follow the accomplishments of the present year. They foretell events and progress we may reasonably expect during the course of the next 12 months. They must be taken into consideration in all industry planning.

Here, gathered together for the first time in a single package, are the news and technical highlights of the year. The 12-month perspective which this report affords enables us to sift the chaff and find the whole grain.

Among the outstanding developments were:

- Commitment by the industry to spend more than $300 million over the next six years for the development of nuclear power.
- Continued drive toward larger generating units and sustained interest in steam at pressures in the vicinity of critical.
- Intensified interest in use of a combination of steam and gas turbine cycles.
- Increased attention being given higher voltages for underground transmission because of growing scarcity of rights-of-way.
- Mounting conviction that EHV is a prudent investment.
- Keen interest in higher secondary voltages stimulated by upward use of residential power.
- Greater efforts being made to coordinate utility sales activities with other segments of the industry.

By any standards this has been another year of impressive achievement. But as this report clearly indicates, there is never enough progress to satisfy the ever-growing demand for better, more economical electrical service.

Perhaps the most valuable contribution of a report such as this is that it charts the areas in which progress is most needed. If it helps call forth the efforts of the industry to solve the problems in these areas, the report will have served its purpose.

# Economic Progress Was Sensational in Present Year

E. BENOIT-SMULLYAN, Economist

The present year was one of sensational economic progress. The Gross National Product rose rapidly: from $360 billion in 1954 to an average of around $387 in 1955. Recently it has been running at a rate of around $395 billion. In October the index of industrial production stood at 142 compared with 126 a year earlier, and 137 at the 1953 peak. Practically every sector of the economy except agriculture registered important gains. Electrical power output rose from a weekly average of 8.8 billion kwhr in 1954 to over 10 billion in 1955, a gain of at least 14% plus.[1]

### Auto Industry Paced Prosperity

As anticipated,[2] the auto industry provided the key to business prosperity in 1955. Early predictions of a six-million-car year by the industry seemed daring. As it actually turned out, around 8 million were produced, confounding all the experts. The sustained high level of home building was also important, both directly and in its stimulus to home furnishings and other industries. Housing starts reached the phenomenal annual rate of over 1.5 million in the second quarter. With a slight tightening of credit terms, the rate later declined to around 1.3 million as predicted.[3] This is still quite high by past standards and far above the figure of pre-World War II years.

### Inventories Were Rebuilt

Other major ingredients in this year's prosperity were the turnaround in inventories and the boom in business capital investment.

Inventories, being liquidated in 1954 to the tune of around $3 billion, were being rebuilt in 1955 at about the same average rate, or a little higher. Of even greater long run importance was the brilliant recovery staged in the field of industrial investment. As forecast,[4] business capital outlays have followed a rising curve during 1955. The year's average will top the previous (1953) peak.

Consumption in 1955 was heavily dependent on consumer credit which rose exceptionally fast, by $5.5 billion or 18%. It was supported too by a very generous round of wage increases. Historic concessions were also made to the unions on their demand for something like a guaranteed annual wage.[5]

### Appliance Sales Soared

High consumer incomes were accompanied by high level sales of electrical appliances, with a corresponding step up in residential power consumption. Comparing the first 9 months of 1955 with the same period in 1954, sales of television sets were up by over a million, refrigerators and washing machines around a half million, and clothes dryers by over a quarter of a million, with substantial gains in most other lines as well.[6] Air-conditioning made particularly rapid strides, with a major breakthrough on the sales of room air-conditioners stimulated by an exceptionally hot summer.[7]

On costs, the situation has not developed so well. Industrial prices have been rising—some of them quite rapidly. For example, between May and November iron and steel prices rose 8%, copper prices 19%, and rubber prices 30%. The cost of borrowing money has also risen; prime corporate bonds now yield about 3.08% compared with 2.89% a year ago. In the wake of major strikes affecting copper production, the power industry has had to be seriously concerned with assuring adequate copper supplies.[8] In the latter part of the year, steel supplies were also tight. With output near or at 100% of capacity the industry was falling steadily behind on deliveries.

At the year-end signs of prosperity multiplied. Retail sales were running 8% ahead of a year earlier. Profits, before taxes, dividends, and wages were breaking all records. But the continued decline of farm income—for the fourth successive year—was becoming a major political headache.

## Continued, but Slower Progress in '56

• Next year is bound to be good. Business plans for capital investment are eye-popping. Larger public programs for roads, schools, etc, also seem certain. And tax cuts, which would build up consumer purchasing power, are also anticipated.

• Even so, it will not be possible to maintain a pace of advance such as we've seen in 1955. There are shortages of skilled labor and materials. The tightening up in mortgage credit terms had led to some fall-off in new housing contracts. And the new cars don't seem to be moving quite so well as last year's models. Consumer surveys don't foreshadow as rapid a buildup in consumption as we had in 1955. And election-year politics may be unsettling to business.

• There may be a sideways motion or slight dip in production in the spring or summer. The sales figures could continue to mount anyhow because of upgrading and higher prices. A pickup could be expected in the fall when the new auto models go into production. In any case the prospect is for an outstanding year for electric power sales.

### References to 1955 Issues of Electrical World

1. 9/19 p 130
2. 1/3 p 60
3. 6/18 p 60
4. 3/28 p 60
5. 6/20 p 60
6. 11/28 p 169
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8. 7/18 p 60

# Meeting Loads, Improving Service Are Primary Concerns

JESSE MOCK, Asst to the Editor

Surprisingly high demand for electric power was the immediate concern of electric utility management during the year. But a host of pressing problems—some directly related, some remote from load growth—occupied much of management's time.

With output running an unexpected 16% above 1954, there was the needling prospect of stepped-up construction programs. Instead of slight cutbacks in capital expenditures in this year and next, it appeared they would be close to or above the 1954 figure of $4 billion.

### New Techniques Are Sought

Along with the zooming load growth came constantly increasing demands for higher quality service as more all-electric homes and automated factories came on the line.[1] The series of hurricanes and floods which harassed the eastern coastal areas greatly complicated the task of improving service reliability and averting outages.[2] Everywhere management was searching for new methods and techniques to improve service and service restoration, but those in the disaster areas had a double reason for their search.[3]

### Rights-of-Way Are Problem

To make way for expanded and additional facilities to meet future demands, utility executives were concerned about the acquisition of plant and substation sites and rights of way for lines. Legislative action in Wisconsin offered a partial solution to the problem.[4] New laws in that state makes it possible for utilities to obtain sites and easements years in advance of actual use. The promise of economies offered by such legislation is certain to interest management in other states.

Increased earnings—a constant goal of management—received additional attention on several fronts. Executives from a number of companies met at Biloxi, Miss., early in the year to discuss ways of boosting revenue and controlling expense.[5] An expense control study conducted by Arizona Public Service Co pointed ways to new economies by simplifying record keeping, increasing mechanization of construction operation, and reducing unnecessary communications.[6] A preliminary look at next year's capital expenditure figures indicate a growing trend toward mechanization, further evidence of the emphasis on expense control.

### Public Relations Studied

Growing awareness of the value of good public relations was evidenced in speeches and public statements of industry leaders.[7] On a national scale there was pressure building toward coordination of existing advertising, publicity, and public relation programs (See page 78). Individually, executives pondered the problems of informing customers, students, and other businessmen of the achievements, the goals, and the other concerns which utilities share with these groups or with other segments of the community.[8]

Scarcity of trained technicians and engineers, which plagued much of industry, still had not had its full impact on utilities. But top executives were well aware of their future needs for such personnel and the serious problems to be faced in the future, particularly in the field of nuclear power. Leaders cautioned the industry that it needs to present a more glamorous picture to attract the kind of talent it needs to do the job it has to do properly.[9]

### Management Training Advances

As a means of sharpening management talent already at hand, training programs and promotion planning went on apace. Utilities sent selected executives to the National Industrial Conference Board's week-long course on atomic energy.[10] Utilities again sponsored public utility executive courses at Georgia Tech, University of Michigan, and Columbia. New thought was given to promotion planning based on organization demands.[11] Written tests and personal appraisal were among the methods used for choosing management candidates.[12]

## More Confidence in 1956

- Increased confidence in the future growth will lead management to plan further ahead and to plan more boldly.
- Expense trimming—mainly through greater mechanization of construction, maintenance, and accounting—will continue to receive considerable emphasis.
- Scarcity of trained personnel will be felt more acutely, leading to pepped up recruitment programs.
- Long range solutions to rights-of-way and plant site location problems will be sought.
- Management will pay closer attention to national public relations programs and legislation affecting utilities.
- Studies of methods to overcome problems in connection with house heating and cooling will be stepped up.

### References to 1955 Issues of Electrical World


1. 10/24 pp 5, 22
2. 8/22 p 108
3. 8/22 p 81
4. 11/7 p 15
5. 2/28 p 62
6. 3/7 p 80
7. 6/27 p 86
   10/10 pp 22, 49
8. 10/31 p 140
   11/14 p 256
   12/5 p 62
9. 10/10 p 49
   11/7 p 15
10. 12/5 p 48
11. 10/24 p 16
12. 10/3 p 86

# Conventional Plants Produced Kwhr;

Conventional power plants in 1955 produced the kilowatt hours, but nuclear power plants produced the news. Consolidated Edison Co of N. Y. started off the year with a bang by asking bids on a privately financed 200-Mw atomic plant.[1]

The April 1 deadline of the Atomic Energy Commission's power demonstration reactor program saw the utility industry submitting plans for four nuclear power plants. They were by Atomic Power Development Associates for a 100-Mw fast breeder reactor, by Yankee Atomic Electric Co for a 100-Mw pressurized-water reactor, by Nuclear Power Group for a 180-Mw boiling-water plant, and by Consumers Public Power District of Columbus, Neb., for a 75-Mw sodium graphite reactor.[2]

### Design of Shippingport Plant Revealed

In addition to these bids the Rural Cooperative Power Association of Elk River, Minn., later in the year proposed to the AEC that the co-op build a 22-Mw boiling water plant. The plan called for financial assistance from the AEC and the Rural Electrification Administration.[3] The AEC has tentatively rejected the proposal for technical reasons.[4]

Pennsylvania Power & Light Co also jointed the atomic parade when it announced in midyear that it is studying plans to build a privately financed atomic power plant of at least 150-Mw capacity. One of the most advanced reactors, a homogeneous type, will be used.[5]

Last year's headliner in the nuclear power news, the proposed Shippingport plant of the Duquesne Light Co reached the final stages of engineering. Design details of the station were released at the Geneva Atoms for Peace Conference. Shippingport will be a pressurized water reactor plant with a 60-Mw output. But designers are confident that operation and tests will allow increase to 100 Mw. Fuel will be U-235 and natural uranium. Steam conditions at the throttle will be 600 psi and 500F.[6]

### Here Are Details of Other A-Plants

Details of some of the other proposed reactors were also released during the year. Nuclear Power Group plant will be built on the Commonwealth Edison Co system. Proposed 180-Mw unit will deliver steam to the turbine at two pressures, 600 psi and 350 psi. The higher pressure will be produced from boiling water going completely through the reactor. The 350-psi steam will be produced by extracting some hot pressurized-water from the reactor and flashing it to steam.[7]

Con Edison's Indian Point reactor plant will use an oil-fired superheater to obtain an overall plant h at rate of 10,700 Btu per net kwhr. Plant output will be 236 Mw, 96 Mw from the reactor and 140 Mw from the superheater.[8] Fast breeder reactor, promised to be the type which has a real opportunity to be commercially justifiable, was choice of the group led by Detroit Edison Co. It will use liquid sodium as coolant and will breed new fuel in addition to producing fuel.[9]

Another big atom news item in 1955 was the Geneva Atoms for Peace Conference. Utilities executives attending the conference returned with a feeling that the U. S. was substantially ahead of any other nation in the breadth and depth of research and development in atomic energy.[10] The U. S. declassified a great deal of material for the conference. Industry was quick to take advantage of this relaxation.[11]

Geneva conference also stirred up talk about the fusion process as a power source (fusion being the joining together of nuclei with a release of energy as opposed to the fission process which is the splitting of matter). However authorities both in and out of the AEC indicate that the problems associated with fusion are great. As one AEC official put it, "Most nuclear power plants using fission as a source of power will be completely amortized before the advent of fusion power on a practical basis."[12]

Most, but not all of the '55 atom talk was about "paper" power plants. On July 18 however the town of Arco, Idaho, received power generated by an experimental atomic plant at Argonne National Laboratory.[13] Next day AEC Chairman Strauss threw the switch that sent atomic electric energy out into the Niagara Mohawk Power Corp system. The AEC's land-based submarine intermediate reactor was used to drive a 12,500-kw turbine generator at West Milton, N. Y.[14]

### Liability Insurance a Necessity

Liability insurance coverage and waste disposal continue to be two of the big problems facing the youthful nuclear power industry. However, in 1955 views on these problems tended to be more optimistic when compared with the '54 predictions. After a four-month study a group of ten top-level private insurance executives said that something could be worked out to provide adequate insurance coverage. The report indicated that (1) the problem is serious, (2) it is bigger than anything faced by industry, but (3) a way probably can be found to lick it.[15] Industry will have to find a way to lick it because the government has announced a hands-off policy.[16]

Some of the experts in the radioactive waste disposal field thought that there are sufficient processes already developed to provide adequate disposal systems for the next 25 years.[17] However an opposite view was expressed earlier in the year by some who felt that the ideal solution must lie outside any ideas currently contemplated.[18]

### First Atomic Trade Fair Held

The AEC made great strides in translating the 1945 Atomic Energy Act into a working set of regulations. Its Division of Civilian Application is working out one of the most ambitious regulatory projects in the history of the government—supervision of the nation's privately owned and operated atomic energy industry.[19]

The first U. S. Trade Fair of the industry, sponsored by the Atomic Industrial Forum was held in Washington, D. C., during the year. Here and on other occasions manufacturers displayed their wares and indicated in lectures and in the technical literature that they are ready and able to serve the youthful atomic industry.[20]

Outside of the U.S. there was also much talk about the atom. In fact in Great Britain it was more than talk as the Calder Hall Plant was in the advance stages of con-

# Atomic Plants Produced the News

JOHN J. KEARNEY, Associate Editor

struction. Britain plans to build 12 atomic power plants at a cost of $40 million over a ten-year period.[6] Canada announced plans to build its first nuclear power plant. It will use a natural uranium fueled, heavy water-moderated reactor.[7] A world survey of atomic progress indicated that 42 reactors are in operation, 20 are under construction, and 48 more are planned.[8]

### Some Conventional Plants Made News

The conventional power plants could not compete with the glamorous atom for the headlines, but they did make some news in 1955. Consolidated Edison Co said it would put a 330-Mw unit in its Astoria plant and another unit of this size in a new plant on Staten Island.[9] Detroit Edison has about finished design and construction on the first two units of its River Rouge plant. When these two 260-Mw units shortly go into operation, they will be the largest in the world, "on the line."[10] The distinction of owning and operating the world's largest planned power plants goes to the Ohio Valley Electric Corp. Its Clifty Creek Plant will have a capability of 1.29 million kw when complete, its Kyger Creek Plant of 1.08 million kw. At present Clifty Creek has five 215-Mw units in operation while Kyger Creek has five 215-Mw units on the line.[11]

Competing with these and other conventional power plants on an economic basis is going to be rough for the nuclear plants as Electrical World's Ninth Steam Station Cost Survey indicated expenses incurred in building and operating today's modern plants continue to decrease. Average cost of building a plant was $131 per kw and average cost of power production was 3.1 mills per kwhr.[12]

Fluid coke, a new fuel, appeared on the scene during the year as Public Service Electric & Gas Co used it in full-scale tests at its Essex Station. This new fuel handles easily, allows simple reinjection of precipitated material into boiler, and has a cost comparative with other fuels on a Btu basis.[13]

Cooling towers continue to gain acceptance as the utility industry finds suitable plant sites more difficult to obtain. Indianapolis Power & Light Co has found that their cost compares favorably with added transmission, coal, and construction costs necessary for plants on river sites but distant from load centers.[14]

### Hydro Plants Showed Improvement

Hydro plants also continue to show improvements. The pump-storage concept was used to good advantage by the Bureau of Reclamation at its Flatiron Plant. Using two speeds for this pump-turbine increased the efficiency of the plant. Unit will run at 300 rpm as a pump and 257 as a generator.[15]

Nothing new developed so far as the actual operation of gas turbines in utility plants was concerned. There was however a great deal of talk about the economics of using the gas turbine in the conventional steam cycle. The calculations seem impressive, but to date only a relatively few plants have utilized this method of improving efficiency. Studies indicate that an efficiency ranging from 40 to 45% can be attained by supercharging the boiler with gas turbine compressed air and using the boiler stack gases to drive the gas turbine.[16]

## Important Areas to Watch in 1956

- Utilities will watch development of first round of reactor power plants before putting more time and money into nuclear power.

- Management and engineers will keep their eyes on the supercritical pressure units going into the Philo Plant of Ohio Power Co and the Eddystone Plant of Philadelphia Electric Co. They no longer, however, consider this pressure range in an unknown realm.

- Large-size units will force designers to seek more economical means of supplying boiler feed pump power—perhaps steam or gas turbine drives.

- Plant modernization will become increasingly important as management seeks to keep abreast of load growth while adequate power plant sites become scarcer.

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1. 1/10 p 52
2. 4/11 p 8
   4/18 p 100
3. 8/8 p 61
4. 10/3 p 82
5. 8/8 p 64
6. 9/12 p 22
7. 6/13 p 71
8. 4/4 p 60
9. 11/21 p 25
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12. 10/17 p 109
    11/28 p 65
13. 8/22 p 87
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16. 8/29 p 10
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19. 9/19 p 110
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23. 8/8 p 60
24. 7/18 p 56
25. 4/4 p 69
26. 5/30 p 78
27. 10/17 p 127
28. 12/5 p 22
29. 7/18 p 16
30. 8/15 p 44
31. 7/11 p 94

# Move Is on to Higher Voltages

Caught firmly between expanding generating capacity on the one hand and dwindling transmission reserve capacity on the other, power company engineers in 1955 looked to higher transmission voltages for relief. And, as rights-of-way became tighter near the big cities, the utility industry took its first steps to stimulate development of underground transmission cable in the 330 to 400 kv range. Utility commissions too saw the threatened right-of-way pinch and eased condemnation procedures in some states. Trouble continued to dog the path of EHV pioneers as new lightning phenomena and other acts of God hammered at reliability records.

## EHV Investment Seen as Prudent

To a growing number of utility executives, investment in EHV was being seen as an act of prudence. Philip Sporn, president, American Gas & Electric Co and pioneer of EHV in the U.S., told EEI at its annual meeting[1] that at 345 kv an integrated loading of 500 Mw per circuit is feasible for a 135-mile line. With a twin conductor design capabilities would be 25% higher or 625 Mw for a single circuit. Such loadings, he said, promise prompt return to a balancing between generators and lines.

American engineers returning from Europe brought reports[2] of the universal acceptance there of 380 kv for bulk transmission. They were satisfied moreover that apparatus as well as transmission designs are available in western Europe today to provide reliable operation at this transmission voltage.

Detroit Edison's team[3] found the British using twin ACSR conductors of 0.175 sq in copper equivalent for 275-kv double circuit lines rated 375 Mw each. The French with 225 kv are looking toward 380 kv with twin conductors. The Swiss feel 220 kv is ample for their small country. Italians are using twin-conductor 220 kv but planning 380 kv with twin conductors for warm regions, single conductors in the icy Alps. In West Germany 220 kv predominates with some 300-kv lines operating. Nine German firms have agreed on 380 kv as the future standard voltage. The Swedes are the standout leaders with 600 miles of 400 kv operating since 1952 and 1,700 miles in prospect by 1956. They use twin conductors on 18-in. horizontal spacing and report that experience has been eminently satisfactory.

## Need for Higher Voltage Cable Grows

Back in the U.S. the rising need for EHV cables in the next 20 years to combat scarcity of right of way for more overhead lines at existing voltage was clearly indicated in a survey[4] of utilities by a task group of the Association of Edison Illuminating Companies. Out of 110 utilities replying 18 are using or considering voltages above 230 kv, and four will use cable. Of 20 companies considering voltages at or near 230 kv, four expect that they will use cable.

Having concluded from this that utilities will need underground cables rated at 230 kv and above in the next 15 years, AEIC took the initiative in the fall of 1955 and authorized[5] a $500,000 high voltage underground cable development and test program. Cooperating with the utilities in the 15-year development program are four U.S. cable makers who will develop and supply sample cable lengths for test.

Again in 1955, as it had in 1954, trouble pestered the early EHV lines in the U.S. and Canada. Early this year a one-in-a-million avalanche[6] in Kildala Pass downed both 300-kv lines supplying Alcan's Kitimat aluminum smelters in British Columbia. One of the two single-circuit lines used a unique aluminum tower design[6] consisting of braced H-frames built of 38-in diam tubular aluminium columns topped by a box-girder cross arm. These towers, of which there were 35, ranged up to 140 ft in height, supported spans up to 2,600 ft long. They had an average weight of 25 tons. Although this light weight paid off in ease of frabrication, transportation, and erection, neither the aluminum towers nor the conventional steel towers that supported the second circuit were proof against the freak snow slide in storm-whipped Kildala Pass 5,136 ft above sea level.

## High Lightning Outages Pose New Problems

Operating experience with the initial portion of American Gas & Electric's 330-kv system has revealed a lightning flashover rate[7] greatly exceeding that predicted by accepted methods. Tower height averages 150 ft and insulation consists of 18-unit strings of 10-in. suspension insulators. A single ground wire is used. Glaze burns suggest that the lightning pulses have very steep fronts. Experience where tower footing resistance is well under 10 ohms suggests that flashovers are occurring at a much higher rate than predicted by usual methods despite low resistance.

The phenomena is not confined to 330 kv. Commonwealth Edison reported similar high outage rate performance on a new section of 138-kv line where tower height is 108 ft and there is one shield wire.

At the lower transmission voltages insulation and shielding changes were made in 1955 to improve lightning performance. Toledo Edison cut outages on its 69-kv belt line from 24.5 per 100 miles per year to virtually zero[8] in this way. Other companies like Public Service Co of Colorado turned to the analysis of lightning performance, structure life, and cost[9] of existing lines for clues to better performance.

## Relief From Right-of-Way Pinch Sought

The same shortage of rights-of-way that impelled the industry to appropriate $500,000 for development of EHV cable led utility commissions in two states,[10] to make it easier to acquire right-of-way for future facilities in advance. An eastern commission now permits right-of-way to be condemned without prior proof that construction is being delayed. Proof of necessity but not immediate necessity is required. In Wisconsin a new law protects easements from being voided because of non-use. A second act lets utilities secure easements in advance of need without an involved PUC hearing. Effect of these laws has been to make it easier to purchase and hold easements against future construction and so hedge against rising real estate prices.

# in Overhead Lines and Cables

DANIEL T. BRAYMER, Managing Editor

Several transmission engineers have sought to use existing narrow right-of-way more effectively by resorting to special structures. El Paso Electric Co used 10 different types of H-frame and one-pole structures[11] to work a new 115-kv circuit into a 40 to 50-ft right-of-way already carrying 66-kv and 24-kv lines. Northern States Power connected two 115-kv single-pole wishbone lines[19] with X-braces to achieve a structure that would work successfully on a 50 ft right-of-way.

Early users of bundled transmission conductors, notably Louisiana Power & Light Co, reported trouble-free experience with twin conductors on 115-kv circuits after more than a year of operation.[18] But at least one leading utility chose to reconductor medium voltage transmission circuits[24] to bring existing line capacity in balance with new generation rather than resort to either higher voltage or bundled conductors. Existing right-of-way was thus "loaded" more heavily. Expense of system changes ruled out higher voltage and fear of conductor damage because of contact ruled out use of bundled conductors.

A utility in the northern plain states found that by locating towers along quarter-section lines and spotting towers at fence intersections,[10] farm land was left unencumbered and nominal spans for a 114-mile, 220-kv line could be increased to 1,320 ft (¼ mile).

Cost cutting construction tools and methods continued to preoccupy those utility engineers and contractors engaged in building important new transmission links. Duke Power Co completed its $6 million, 75-mile, 230-kv Riverbend-Tiger line in 200 working days, five weeks ahead of schedule,[16] by using a light-weight portable aluminum gin pole, cable stringing trucks carrying three payoff reels, and an oversize 54-in earth auger. Central Hudson Gas & Electric Corp developed a technique for grouting reinforcing rods into rock[17] to form a grillage and so anchor tower footings to rock on its Marlboro-Danskammer 115-kv line.

Down in Texas a utility building a 187-mile, 138-kv H-frame line stepped up material delivery by studious spotting of three major and seven minor material storage yards[14] along the route. First use of a double-plank truss-arm H-frame construction was made by Southwestern Public Service Co in a line designed for ultimate 230-kv operation. The new design offers 6.9% saving over two conventional designs considered. Designs for 138 kv and 161 kv didn't provide sufficient capacity margin for expected growth.[15] Cleveland Electric Illuminating Co made effective use of an automatic reeling machine during re-conductoring of existing 34.5 and 132-kv lines to bring capacity in line with new generating capacity.[20] The machine pulled a mile of line per hour.

During 1956 a de-energized full-scale mock-up of a power system was subjected to an atomic blast equivalent to 35 kilotons of TNT.[21] At one mile damage was surprisingly light being confined to overhead lines. One light 69-kv suspension tower was toppled.

## Upward Trend Will Continue in 1956

- 1956 will be the most active year of the last five for transmission.
- Look for growing acceptance of bundled conductors at all voltages.
- Twin conductors in vertical configuration will be the popular choice.
- New research will be initiated into traveling wave theory to solve high lightning outage rates on EHV and medium voltage lines.
- Shortage of rights-of-way for new lines will continue to spark moves to higher transmission voltages as new lines are built to restore capacity balance between generation and lines.
- State regulatory commissions will be called upon to aid utilities in rights-of-way procurement problems.
- Work will begin on EHV cable designs for 330 kv and higher.

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21. 5/23 p 16

# Rapid Growth of Distribution Speeds

Distribution's renaissance continued unabated in 1955. And many monuments stand to mark its progress. Among these are:

1. Expansion at a rate exceeding all past years but one.
2. New methods to serve soaring residential and commercial loads.
3. Programs to eliminate inadequate service connections and meters which impede fuller electrification of existing homes.
4. Adoption of production-line methods for line construction.
5. Reappraisal of distribution transformer capabilities and installation methods.
6. Extended use of capacitors for voltage and power factor correction.
7. Advances in system design and protection to improve service reliability.

## Expansion Is Rapid

Forecasts in January showed $1,344 million in 1955 distribution budgets.[1] This figure exceeded all previous years except 1949 but is consistent with the trend to $3.1 billion predicted for 1970.[2] Expected growth in residential and commercial sales and the upward trend in consumer disposable income offer assurance that revenue will support soaring investments.

REA's 20th anniversary statement claimed 93% of farms electrified. Co-ops reported $413 million annual revenue from 16.5 billion kwhr sales.[3] And a large utility predicts that the growth trend from 700 kwhr in 1925 to 6,280 kwhr in 1954 will push its average farm customer to 20,000 kwhr in 1970. Individual farm demands have climbed from 0.5 kva average in 1925 to 5.0 in 1953 and soar toward 10 kva for 1970.[4]

Viewing this rocketing growth, EW asked, "Is Today's Distribution Obsolete?" Its conclusions:

1. Boosting 2,400 v to 4 kv is clear gain, but changing to 12 kv requires rapid growth to prove attractive.
2. Service drops of No. 6 are questionable, and No. 8 is obsolete for today's residential loads.
3. Two-wire meters, small transformers, and secondaries of No. 4 and smaller must be considered obsolete.[5]

But progressive engineers have boldly plotted future system patterns, generally with 12-kv distribution from large substations served by 34 to 69-kv subtransmission.[6] Commonwealth Edison Co converts gradually to 12 kv by serving local 2,400-v branches with stepdowns from new 12-kv trunks.[6-7] Toledo Edison Co applies 12-kv design for all replacements and improvements.[8] Among systems retaining 4-kv distribution, Indianapolis P&L Co sees $80,000 savings in 10-yr primary network program.[9]

## New Residential Systems Develop

Secondary distribution to residential areas with high incidences of electrical cooling and heating remains a problem. Los Angeles solved it by banking distribution transformers on triplex aluminum secondaries with duplicate secondaries for major loads. Houses with air conditioning are connected with separate triplex service drops to the two secondaries.[10]

Westinghouse engineers see higher service voltage as the solution to residential problems. Their proposal of a 254/440-v 4-wire system would include small autotransformers at each service for lighting and small appliances.[11] Its authors see $130 per home savings over 120/240-v service; others doubt that either 254/440 or 240/480 can save enough to "sell" customers on the change. Standardization can be guided by the EEI Task Force's recommendation of 265/460 v with 254/440 "an acceptable alternate."[12]

## 265/460-V-Gains in Commercial Areas

In the network area 265/460-v service forged ahead. First connection under Con Edison's 1954 proposal was three 2,000-kva transformers to power presses for New York's Daily News.[13] And Central Illinois Power Co sees 20% savings in future expenditures by converting its Peoria 120/208-v network to 277/480 v.[14] Committee study has resolved limiter characteristics to meet protection needs of network cable.[15] Probability analyses by General Electric engineers prove that prompt maintenance of defective protectors can give a 3-unit spot network the service availability usually expected when a fourth unit is added for insurance.[16] And interrupting duties of spot network installations are cut 60% by design with planned reactance.[17]

Pre-cast concrete saves Long Island Lighting Co $4 per base for street lighting standards,[18] saves Northern States Power 35% for manholes.[19] Semi-buried precast vaults and buried cable enable Southern California Edison Co to cut the cost of underground distribution for 186 homes to $226 each, half the usual cost but still 3 to 5 times overhead distribution cost.[20]

## Inadequate Meters and Services Yield

Meters and services were evaluated as a barrier to load growth by an EW survey which showed 30% of meters inadequate and 22% more too small for ranges and dryers.[21] Basic reason is reluctance to discard 5-amp meters.[22] But a retirement program in St. Louis is replacing such meters when they approach 335 kwhr monthly reading[23] while Long Island Lighting confines them to low-consumption services.[24] Metermen face the future with proposals of new universal meters suitable for 265/460 v as well as most existing services.[25]

Metermen seek savings also in practices more closely coordinated with reading and billing activities.[26] One utility saves $52,000 annually by leaving services "hot" when customers move, sees added savings in estimating final bills.[27] Meter shops turn to automation and group testing for accuracy and economy.[28] And American G&E finds savings of 30¢ per meter in field testing with a well-equipped truck.[29]

Service connections share with metering the onus of inadequacy. But they also are yielding to the effort of utilities which have accepted the challenge.[30] Kansas City's solution is a special service cable of two Neoprene-insulated aluminum conductors lashed with a bare aluminum ribbon neutral. It has installed 30,000 continuous runs from pole to meter socket, finds them trouble free.[31]

# Search for New and Better Methods

LEONARD M OLMSTED, Associate Editor

Line construction becomes more specialized. Coast Counties G&E sends out a pole crew to frame and set poles ahead of the line crews. Earthborers and other power tools speed their work.[46] And Southern California Edison assigns special crews to "cold" work on large projects. Organized details dig holes, assemble poles, set them with derrick trucks, backfill, and string conductors. Here, again, power tools are used for many operations.[50] Cleveland uses a motor-driven machine to string and sag conductors in urban work,[54] and Pacific G&E's 4-wheel trailer strings four 336.4 MCM ACSR simultaneously under controlled tension.[55]

Distribution transformer loading is receiving new attention since the 1954 heat storm. Load limits have been cut to 133% or lower, and there appears to be a trend toward self-protecting transformers with 130% emergency limits.[39] Kwhr meter readings measure transformer loads for Oklahoma G&E with about 0.9 manhour per transformer.[37] But Texas Electric Service and Arkansas P&L use accounting machines to compute loads from punch cards with errors usually under 10%. These machines can compute secondary drops at the same time.[38] Curves indicate economic transformer sizes for any initial load and rate of growth for Indianapolis P&L.[36]

For 4-wire-delta light and power, Ebasco Services finds that two transformers usually serve better than three.[40] And Oklahoma G&E places the second transformer on the pole where 3-phase is required to save $127.[41]

Use of shunt capacitors continues to soar. General Electric reports the ratio of ckvar to peak load kw reached 0.33 in 1954, predicts 0.50 by 1964.[42] Texas Electric Service finds justification for applying capacitors to boost pf to 0.92 or better.[43] Secondary capacitors are installed in customers' basements near service entrances by Toledo Edison for maximum correction of network voltage at low cost.[44] But Philadelphia Electric's inexpensive sidewalk vaults place capacitors on their network for $20 per ckvar.[45]

Substation design has been reviewed by Long Island Lighting to cut the cost of circuit breakers without impairing service reliability. They have settled on one breaker for the initial installation with provision for three in the ultimate development.[46] Construction moves steadily toward standardized structures, with Georgia Power reporting savings of $230 per structure for various types of stations up to 44 kv.[47] Landscaping solves many appearance problems,[48] but Atlantic City Electric has resorted to semi-enclosing substations in cottage-like structures.[49]

Trees remain an insidious threat to distribution. Arborists, lighting engineers, and utilitymen weighed all angles at the Cleveland Shade Tree Conference.[51] Southern California Edison, Pacific G&E, and Cleveland Illuminating announced programs to promote more compatible planting.[52] And others turn to rapid clearing of faults with faster circuit breakers[53] and oil reclosers.[56] Automatic sectionalizers coordinate with these to limit interruption area[54] and permit picking up feeder load after a prolonged outage.[55]

Aerial cable is proving storm-proof for Narragansett Electric's primaries in heavily treed areas.[56] And application of transmission design methods cut lightning damage to open-wire feeders and substations.[57]

## The Year Ahead Will Bring:

- Continued distribution expansion at new record levels.
- Closer agreement on methods and voltages for heavy residential loads.
- Reappraisal of transformer characteristics for economy under new loadings.
- Simplification of designs for economy in construction and operation.
- Evaluation of distribution performance to promote service reliability gains.
- Expansion of mutual assistance plans to speed disaster restoration.

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20. 5/23 p 47
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    7/25 p 106
    10/17 p 162
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57. 10/10 p 10

# Sales Were High in '55; But the Future Remains Bright

E. BRYSON SESSIONS, Commercial Editor

"Better than we hoped for—in fact, much better," is the way one utility commercial vice president summed up the year 1955.

It was a year which nearly everyone, economists included, underestimated. Business was good, even great. Wages were high, people had money to spend, and they spent it.

## Appliance Sales $7.4 Billion

From preliminary estimates it looks as though home appliance sales will hit $7.4 billion, equal to the 1950 record. Hottest item was the clothes dryer. Some utility areas reported dryer sales gains double or better than '54. Housewares and TV did well too. And even sluggish dishwasher sales were given a shot in the arm.[1]

Through it all, there clearly emerged a new figure in the appliance merchandising picture—the merchant home builder.[2] And the more sales-conscious utilities were quick to train a promotional beam on him.[3] The all-electric home is suddenly becoming a glamorous, exciting thing, and color and built-ins are in large part responsible.[4]

## Cooking Ignored

Residential sales seemed to evoke most excitement. But still it is the commercial field where utilities traditionally make the most money. And traditionally it failed to get the selling attention it deserves. Even so, it delivered well, particularly from refrigeration—its old reliable—and from growing sales in comfort cooling[5] and lighting.[6] But cooking and heating were too much forgotten. Dubbed the utilities "poor little rich load",[7] cooking offers rich rewards—$640 EAR per food service customer. Its main troubles: lack of management support, promotion money, and trained manpower to sell it.

The great farm market also has suffered under these conditions, but that picture is now changing. Some $24 billion worth of electrical farm equipment and appliances will be sold between now and 1975, says an REA survey,[8] and utilities—investor-owned and co-ops alike—are pooling their sales resources for a rural market push.[9]

Without doubt, booming 1955 gave utility sales people cause for rejoicing. But it also served to underline continuing problems and bring on some new ones.

Inadequate wiring by now is universally recognized as a top-rung worry. EW reports[10] showed utilities were spending more money on it, developing promotional programs and finance plans. But still they put too little manpower on it, and there is no coordinated industry effort to sell it.

And what about present utility sales philosophies? Do they need revaluation in view of rapid changes taking place in the whole marketing machinery and in view of companies' earnings position?[11] There were calls this year for utilities to make their selling decisions on basis of longer-range planning.[12]

Closely allied with all this is the question of summer load peaks. Air conditioning has only gotten a start, and peak energy use in hot weather will spread more and more across the map.[13]

## House Heating More Popular

Electric house heating, the heat pump, and lighting more than ever appeared to be the best wintertime compensators. House heating is growing in favor with utilities;[14] and as more data becomes available, worries about its load on distribution systems are diminishing.

Complexion of the heat pump is changing, too. A more compact unit of higher efficiency was introduced this year,[15] and in California and Ohio all-electric home projects with 431 and 80 heat pumps, respectively, were announced. Commercially, they showed similar promise; 40% of this year's output went for commercial use.

## What Is Ahead in 1956

- Residential—Sales growth at nearly same rate as this year (10.8% vs 11.7%). Trends: More promotion of heating, two-temperature refrigerator, quick recovery water heater; more builder programs; built-ins will buoy range sales; lighting programs will pick up.

- Commercial—New but still too modest attention to this prosperous yet complacent market. Refrigeration and cooling up again; lighting sales will improve with help of store modernization and shopping center construction; heating will get better foothold, ditto cooking.

- Farm—Selling groundwork will continue to be laid, but full fruits of efforts still a year or so off. Bulk milk cooling equipment and water systems should do well.

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14. 8/15 p 62; 9/26 p 55
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16. 3/28 p 55; 6/13 p 134; 7/11 p 158

# New Developments Aided Industrial Progress in 1955

ALLEN LONG, Industrial Editor

New developments in 1955 included a unique fluorescent lighting system for the third tube of New York's Lincoln Tunnel,[1] a 15-kw oil well heater,[2] electrostatic spraying of plastic coatings,[3] an electric airplane dock,[4] and a method of spraying electric heaters on curved surfaces.[5]

### 265/460Y Trend Continues

The trend toward higher distribution voltages in large office buildings continued through the year. New York's Coliseum and Socony-Mobile buildings are to take power at 265/460Y. William Zeckendorf's proposed Palace of Progress in New York, still in the design stage, may use a similar voltage.

Induction heat, a useful production tool in both heavy and light manufacturing, made significant strides. That interest in it is keen is attested by the time devoted to it at technical meetings. It will be subject of many discussions at Industrial Electrification Council's Industrial Heating Conference, Cincinnati, Feb. 6-10.

### Teaming Induction Frequencies

Attention especially is fixed upon low frequency (60-cycle) induction heat and the economies that can be attained through teaming it with high frequency heat. Such benefits include up to a 20% saving in initial investment and relatively high production rates.[6] Usually the 60-cycle unit raises the workpiece to an intermediate temperature. The high frequency unit finishes the job.

Induction heat lent itself well to mass selling at West Penn Power Co[7] when steelmen were shown how it could heat ingots and billets quickly and economically. This year Western Canada Steel, Ltd, Vancouver, applied a dual-frequency induction furnace in a rolling mill to heat ingots to rolling temperature.

The industrial application of the heat pump got another boost as Prof George S. Smith, University of Washington, showed how it could be used economically in sewage plants.[8] He pointed out that heat pumps can be economically better than oil-fired boilers when electricity costs less than 10 mills per kwhr.

### Lighting Promotion Gets Going

The need for a concerted push of industrial lighting by utilities motivated both NEMA and EEI to establish vigorous educational and promotional programs. After discovering that 85% of America's industrial and commercial establishments have substandard lighting,[9] NEMA conceived the idea of organizing bureaus throughout the country to educate and train salesmen, to certify lighting installations that meet the proper standards for the buyer, and to promote good lighting on the local level.

To date ten such bureaus are operating under procedures and policies of the National Lighting Bureau in New York. These bureaus already have stimulated better industrial lighting substantially. The two oldest bureaus are in Rhode Island and Eastern Massachusetts. Rhode Island this year certified 62 plans calling for 4,124 fixtures and a power demand of 725 kw. Massachusetts, in seven months, okayed 205 plans involving 8,844 fixtures and 1,500-kw demand.

### Lighting Mailers Selling Fast

EEI prepared a series of planned lighting mailers aimed at the industrialist. Twenty-six utilities already have bought more than half of the first press run of 50,000 copies each, with exception of the maintenance mailer which was expected to be a slow but steady seller. EEI reports that more than 5,000 copies of "The Facts of Light in Modern Industry" have been snapped up in the opening year of this lighting campaign.

The Industrial Electrification Council announced in December that it is setting up an Industrial Electric Power Distribution Division. When organized and operating, this group will help utilities promote good power handling facilities in industry.

IEC's Metal Sheath Electric Heater course,[10] designed to teach plant electricians to make small heating installations by themselves, already has been bought by 27 utilities. Consumers Power Co and Ohio Power Co each bought two courses. Electricite de France also bought a course. More than 5,000 student texts were ordered to accompany these courses, necessitating a second printing of 2,500 texts.

## 1956—Year of Promise for Industry

- Industry will team high and low frequency induction heating to an even greater extent.
- The swing toward high distribution voltages in big buildings will continue.
- More well-lighted, air-conditioned, windowless factories are coming.
- Steady increases in the use of automated machinery lie ahead.
- The number of air-conditioned factories will climb steadily.

### References to 1955 Issues of Electrical World


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# Equipment Price Slashes Disrupted Buying Practices

ARY MOSSIMAN, Mgr, Market Research

Prices made headlines in 1955 as competitive price cutting resulted in discounts that ranged to 50% on some lines of heavy equipment.

It was impossible to determine when the price cutting started, but apparently some trimming started shortly before the first of the year. By the end of the first quarter prices on key item of heavy electrical equipment had dropped drastically, gained strength, and stabilized near November 1954 levels.[1]

### Prices Varied Widely

In September increases in equipment prices averaging about 10% were announced by several of the principal utility suppliers.[2] Increases in labor and material cost were cited as the reason. As a result of price cutting earlier in the year and increases later in the year, prices on some items during 1955 ranged from 50% to 110% of list within the first nine months of 1955. Many lines of equipment, however, were in heavy demand during the year, and prices on these held firm or strengthened. This was particularly true of distribution apparatus.

### Bargains Brought Orders

During the first quarter utilities placed orders for new equipment at a record rate because bargain prices were offered.[3]

Nobody was able to put a finger on the cause of the biggest price break in decades, but utility buyers generally leaned toward the belief that the price slashing was started in a small way as an incentive to get future orders on the books.[4]

Particularly disturbing to utility buyers was the disruption of normal selling and purchasing procedures and customer-vendor relationships during the frenzied "white sale" period.

Also of grave concern to utility buyers was the lengthy strike of one of their key suppliers—Westinghouse. This strike which started in September was still going on late this month. Delays in delivery caused by the strike in turn caused delays in the construction of projects for which equipment ordered from Westinghouse was destined.[5]

Copper prices rose drastically during 1955 and reached a level more than 250% higher than that which prevailed at the end of World War II.[6] Much of the increase was attributed to a phenominal world-wide demand for copper. The situation was complicated by labor difficulties and the uncertainty of foreign prices and supplies which prevailed year long.

Utilities and other large consumers of copper sought relief from high copper prices by switching to aluminum.[7] Aluminum producers and fabricators met the challenge of increased use of the white metal with a notable expansion of facilities.[8]

### Businesses Are Expanding

Industry in general is meeting increasing demands for all types of goods (both consumer and industrial) with a wave of super expansion. Business as a whole is now planning to spend 13% more for new plants and equipment next year than it did this year. Actually the first indications of a period of frenzied buildings came late this year.[9]

An indication of how frenzied this construction boom may become is the fact that American manufacturing industry is now planning to spend 30% more for new plants and equipment in 1956 than it is spending in 1955.

Expansion of this magnitude is already causing some strain on existing capacity to produce construction materials and equipment. As a result deliveries were falling behind.

## Ups and Downs Ahead in 1955

- Expenditures for distribution materials and equipment are expected to increase substantially.

- Utility purchases of materials and equipment for generating facilities are expected to reach a low ebb during 1956 along with a decrease in construction budgets. But the anticipated decrease will be due to smaller outlays for generating facilities in advance of a lower level of capacity additions during 1956 and 1957.

- Inventories and inventory control will probably be the subject of a great deal of attention on the part of both utilities and vendors. Much of the effort will be directed toward attaining a balance of inventories which, in addition to being equitable, will provide ample stocks.

- Other probable developments are:

Short supply of aluminum, copper, steel plates, steel bars, structural steel and many other steel products.

A continued interest in packaging and warehousing.

### References to 1955 Issues of Electrical World


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2. 8/1 p 59
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# Interest Rates Up; Financing and Rate Boosts Down in '55

HERBERT R. FRANKEL, Associate Editor

Higher interest rates, a sharp drop in security financing, and fewer rate increases granted were the highlights in the field of finance and regulation in 1955.

The yields on first quality bonds hit a high for the year at 3.13%[1] on Aug. 25 as against 2.89% on Dec. 31, 1954.[2] On Dec. 1, 1955, the yield on these bonds stood at 3.11%. The second and third quality bond yields showed a similar pattern.

### Reasons for Higher Rates

The higher interest rates came about after these developments:[3]

- Mortgage period on housing was shortened from 30 to 25 years and down payment was increased.
- U. S. Treasury bill rate hit 1.85%, highest since the fall of 1953.
- Prime rate on commercial loans was boosted by the banks.
- Federal Reserve Board increased the rediscount rate to the highest level since 1934.

### Security Financing Off

Total security financing to the public for the first nine months of 1955 amounted to $998.2 million as compared with a record $1.8 billion for the like period of 1954.[4] For the fourth quarter of 1955 it is estimated that security sales will total over $400 million. This will bring total security sales to the public of over $1.4 billion in 1955 as compared with $2.1 billion in 1954.

There was a considerable reduction, both in the number of companies seeking rate increases and the amount of rate increases granted, in 1955. A total of 19 companies were able to obtain $25.3 million in rate hikes in 1955 as against 21 companies which obtained rate increases totaling $54.2 million in 1954.[5]

No major developments or changes took place in the regulatory theories of the commissions. States which have enforced the original cost doctrine have granted rate increases based, generally, on "bare bone" capital costs of 6% or lower, although in certain instances the rigidity of such decisions was alleviated by giving the utility a "year-end" rate base and the inclusion of cash working capital.

Rates in excess of 6% were granted by the Missouri Public Service Commission in the case of Kansas City Power & Light Co[6] with a return of 6.47% while the California commission allowed a return of 6.25% in the case of the California Electric Power Co.[7] In both instances a foreseeable future decline in the rate of return was given as the reason for setting rates above the 6% level.

As usual, the "fair value" jurisdictions fared generally better. Thus, Central Maine Power Co[8] received a return on its fair value rate base equivalent to 6.34% on its net original cost rate base.

Central Illinois Light Co[9] obtained a rate of return of 6.75% on its net original cost rate base while Scranton Electric Co[10] in an order granted late in 1954, but applicable substantially to 1955, received a rate of return of 7.29% on net original cost.

On general matters of regulation which, while not bearing directly on electric industry but still of interest to it, was the decision of the New York State Supreme Court that the New York Public Service Commission must give recognition to fair value in determining rates for the New York Telephone Co.

The decision of an Iowa District Court[11] that gas rates to a municipality must be based on fair value should be of great interest to utilities which are seeking to obtain equitable rate relief by the fair value route.

### Depreciation Orders Issued

The major emphasis in 1955 has been with respect to commission rulings on liberalized depreciation. To date, 13 commissions have issued 17 orders, eight authorizing restricted or appropriated surplus accounting; seven, the tax reserve method; and two resulted in denials of applications.[12]

A considerable amount of concern was caused in the industry by the so-called Colbert report which stated that the deferral of taxes is nothing but a permanent reduction of the tax liability to the utility using the liberalized methods of tax depreciation and therefore, a commission should use actual taxes rather than normalized taxes in setting the rate of return. This report, which was slated for a vote of adoption at the 67th annual convention of the National Association of Railroad and Utilities Commissioners at Asheville, N. C.,[13] failed in having any affirmative action taken on it.

## Highlights of the Coming Year

- Long term money rates will go higher.
- "New money" financing will be on the increase.
- Rate increase grants will decline.
- Common stock dividend payments will be higher.
- More commission orders on liberalized depreciation will be issued.

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    12/19 p 63
13. 11/21 p 54

# 1955 Saw Rise in Public Esteem

The past year was marked by several notable public relations and advertising activities. A smashing victory for Washington Water Power Co over the Stevens County PUD in a special election proved again that when the public is given all the facts, it will choose private enterprise in preference to public ownership in the majority of cases. At the same time there was no let up in the attacks on the industry from federal power expansionists, and public relations departments had to keep alert for misrepresentations and distortions about the industry.

The Stevens County, Wash., victory can be largely attributed to the hard work of Pres Kinsey M. Robinson and his company's employees. They conducted a door-to-door campaign, spoke at mass meetings, and used various advertising media to get their story across. At stake was the company's $3-million worth of property in the county. This was the first time since the PUD was brought into existence in 1936 that the public had been given a chance to reconsider. The 72% vote in favor of selling the PUD's electric facilities was a strong indication that the benefits of public power are not always what its proponents say they are.[1]

## Branch Nullified Chudoff Charges

Another notable example of good public relations paying off favorably was the prompt and insistent uncovering of the manifest unfairness of the Chudoff Committee hearings with reference to the Clark Hill Dam situation by Harllee Branch, president, Georgia Power Co.[2] Here was a case where silence could have had only one result: The presentation to the public of a completely one-sided and false picture. As it turned out, the timing and weight of Branch's repudiations of the Chudoff accusations completely nullified their effect. Papers all over were able to give two sides of the matter instead of just one. In the end it was an editorial in the Washington Post that forced Chudoff to issue a statement clearing Georgia Power of "improper action or influence."

## Hurricane Efforts Won Public Praise

Abnormally severe storms for the East Coast placed a heavy burden on the public relations departments of utilities, but they turned in outstanding performances under what, in many cases, amounted to extreme emergency conditions. Consolidated Edison Co of New York won praise for taking the public into its confidence in an advertisement explaining just exactly what happens to a utility when its area is hit by a severe storm.[3] Pennsylvania Power & Light Co also did a noteworthy job with public, employees, and stockholders.[4]

PUAA continued to grow, and interest in the association was again reflected by the large participation in the Better Copy Contest which attracted over 2,000 entries.[5] At the annual convention in Chicago, PUAA's cost analysis report revealed that the number of electric companies spending $1.00 or more per customer for advertising had increased to 53% from 38% the previous year. Electric companies increased their advertising expense per customer 26% to $1.03 in 1954 from 82¢ in 1953. There was little change in advertising expenditures as a percent of gross revenue. There was a big jump in the use of television for advertising by utilities.[6]

After four seasons of sponsoring the "You Are There" television show, ECAP decided it was time for a change. As the year was drawing to a close, ECAP was considering a new approach for the electric companies.[7]

## Act, Don't Say, "Let George Do It"

The seventh national opinion study conducted by Opinion Research Corp showed that private ownership sentiment continued at the high level of 56% reached two years ago. Support for business ownership remained steady in the face of a general shift toward the left in the public's thinking. But the survey also disclosed a general lack of concern by the public with the issue of public versus private ownership.[8]

The PIP annual workshop conference in St. Louis underscored the need for more outspokenness on the part of the industry to counter the frequent attacks of federal power advocates. PIP Steering Committee Chairman Carl J. Forsberg, president, Wisconsin Power & Light Co, told the meeting, "We cannot remain divided. We must have a sense of individual and company responsibility and a sense of urgency. If we have these ingredients, we will present a common front matching that of our opponents. All of us have a definite responsibility to pull our own weight. There is too much tendency to say, 'Let George do it'."[9]

New York State Electric & Gas Corp was the winner of the Reddy Kilowatt Annual Report Award for a report best simplifying, dramatizing, and humanizing company operations. Judges for the contest found in general that the reports entered in the contest were all of such outstanding excellence that judging was an extremely difficult task.[10]

## Interest in Area Development Grows

Companies continued a high level of activity in community improvement projects,[11, 12] and there was increased interest in area development. At the Edison Electric Institute Area Development Workshop, Georgia Power Vice President C. M. Wallace noted, "Area development is a fascinating and highly profitable enterprise for all concerned. But for the electric utility it is an invaluable public relations builder, insuring the future growth of the area."[12]

## References to 1955 Issues of Electrical World


1. 12/5 p 8
2. 11/28 p 160
3. 10/3 p 200
4. 5/16 p 208
5. 5/30 p 79
6. 11/28 p 160
7. 6/13 p 68
8. 10/31 p 140
9. 6/27 p 264
10. 3/7 p 196
11. 4/18 p 226
12. 11/7 p 55

# Political Fight to Dominate 1956

V. CRAIG RICHTER, Associate Editor

A year of decision—A year of action—A year of hard political fighting by both the privately and publicly-owned electric utilities best describe 1956. Expect all the techniques, all the methods of public relations and advertising to come into play as the industry keeps an eye toward the November elections.

On the electric company side a new, bolder spirit pervades the thoughts and actions of leaders. New thinking has crept in; new faces have come to the fore. New appraisals have been made.

The public power advocates have lost little of their fight. They can count some important victories in their infighting with the Eisenhower Administration, and they can continue to draw on the enthusiasm and energy of a loyal group in Congress. These advocates can be counted on to push federal power issues to the forefront in the coming legislative and election battles.

Rural electric cooperatives, although small as utilities go, still wield considerable political power. They will continue to be courted by both the public and private power partisans.

### Little Choice in Parties

One thing is emerging more clearly: The political parties offer less of a choice between public and private power than many utility men had once thought. While the public power group has roundly condemned the Eisenhower Administration, there are also mixed feelings toward the Administration by private power backers. At the same time there is rising in the Democratic Party a spirit of "moderation" which appears to bring it near the "middle-of-the-road, progressive-conservative" philosophy of the Eisenhower Administration.

This appraisal points less to a choice of administrations as the answer to equitable treatment for an industry which has become the favorite target of vote-seeking politicians than to an informed electorate which will demand a halt to federal power expansion.

Specifically, the outlook for 1956 shapes up like this:

- Public power advocates will go all out to exploit their victories of the past year but will make little headway in promoting federal power or adding to their already substantial gains in connection with preference in purchase of federal power.
- Look for the emergence of the public power advocates in the Truman Administration. Former Interior Secretary Oscar Chapman and Reclamation Commissoner Michael Straus will be back in the public eye.
- Electric company activity will be stepped up on several fronts:

**Associations**—There will be no overall changes in the status quo with respect to the handling of the industry's affairs by associations and agencies such as Edison Electric Institute, Electric Companies Advertising Program, National Association of Electric Companies, and Electric Companies Public Information Program. However, the feeling is growing among the industry's leaders that there should be greater coordination among these various groups and greater support for them from the industry. Look for some moves to this end.

There will be changes of emphasis and direction in agency and association activities in keeping with the reappraisals. These are the indications:

**EEI:** While the institute has been the reservoir of the industry's statistical, technical, and research activities, look for stepped up efforts to merchandise the industry's technical accomplishments and to gain greater public understanding of the industry's problems. The EEI convention this year will emphasize public relations and will be tied to the theme, speak to the people.

**NAEC:** There will be greater industry support and participation in the activities of this association.

**ECAP:** Careful study of all the factors involved, of the problems and limitations of media and budget, have led to the decision to concentrate ECAP advertising in 1956 in magazines. It is felt that this medium offers the electric companies the best opportunity to get across its message in an important way to the most people. Television costs have reached excessive heights, and shows the ECAP budget could sponsor are not the right ones.

The ECAP budget makes it the eleventh largest single magazine advertiser.

Thus ECAP advertising will be placed in 31 magazines comprising the following markets: The mass circulation field of men and women of voting age, the field of business and civic leaders and professional people, the opinion forming magazines, farm and small town magazines, editorial magazines, and youth magazines.

**PIP:** Objectives here will be geared to the election and the gaining of greater public understanding of the industry's problems and the legislative injustices under which it has to operate.

**General Objectives**—Individual company, as well as group public relations and advertising activities will emphasize these fields in 1956:

**Preference Clause:** This legislative iniquity is still a powerful force. Look for increased informational efforts to tell the public the facts about preference. Also possible is a legislative move to provide fair treatment for all electric consumers.

**Adequate Wiring:** The industry will step up its efforts to inform the public on the handicaps of inadequate wiring. Through EEI an intensified advertising campaign will be directed to this end.

**Atomic Power:** Efforts will be directed at gaining greater public knowledge of atomic electricity, at removing the misconception that atomic electricity will be as cheap as some have been lead to believe, at removing public fear of atomic power plants in their communities, and at combating efforts by public power advocates to establish "yardstick" atomic power plants.

**Stockholders:** The electric industry now has nearly 4 million owners and, in addition, many millions who are indirect owners through life insurance policies and mutual savings banks. Greater educational efforts will be made in the direction of this group.

# Partnership Power Policy Forging Ahead under Fire

WILLIAM GILMOUR, Washington Correspondent

Winning a few rounds, losing others, the Eisenhower Administration pushed forward its fight for partnership development of the nation's power resources.[1] At year's end the scorecard read in partnership's favor.

The big victory came, not in the Democrat-controlled Congress, but at the Federal Power Commission. After a three-year battle, FPC licensed Idaho Power Co to develop the hydroelectric potential of the Snake River.[2] Licensing made Democrats furious, but they settled down quickly to planning an all-out campaign to nullify the license. The Administration will have to hold its own against this onslaught if Idaho's license is to be secure.

### Go Slow on Projects

Eisenhower's personality may play a big part in this, as it did when he stood as a bulwark against Democrats' attempt to ram through 11 reclamation starts last session. That rash of authorizations would have cost the Treasury almost $800 million over the next few years.[3] In signing the bill, the President said he would examine every start with a microscope before obligating the nation for years to come.

Strength of Republicans on the partnership front, thus illustrated, consisted mainly in Administration dedication to economy and failure to back down before Democrats' demands for more federal projects.

### Memphis Moves In

Break in the Administration line on private development came with the Dixon-Yates issue. Eisenhower had ordered the private power contract signed a year earlier but cancelled it without warning when Memphis, Tenn., announced it would build its own steam plant and refuse to take Dixon-Yates power.[4] Government then decided it wouldn't pay cancellation costs; Dixon-Yates threatened to sue.[5]

Idea of supplying Tennessee Valley Authority with Dixon-Yates power had grown from previous refusal of Congress to give Tennessee Valley Authority money for new steam plants. During Dixon-Yates hassle, TVA directors came up with a new plan to finance steam expansion through revenue bonds, without Congress' help.[6]

New partnership ideas came up. Pacific Northwest utilities banded together, suggesting complete local financing, government ownership of power features of John Day Dam in Oregon.[7] PUD's and cities were invited to join in paying for, and sharing, power output.

Trinity River Project was authorized, passing over the partnership question for the time being.[8] A two-year study of partnership benefits was ordered by Congress, presumably to bypass an election fight. Word was that California Democrats favored Pacific Gas & Electric Co partnership plan but could not afford politically to accept one partnership proposal while attacking whole concept.

Administration-backed Upper Colorado and Fryingpan-Arkansas projects —only big federal developments put forth by Eisenhower—were left hanging fire.[9] While endorsing these, Administration did not rule out partnership plans suggested by utilities in each area.

### Marketing Policy Unsettled

Administration abandoned attempt to sell Clark Hill Project power to Georgia Power Co.[10] Acting on advice of the attorney general, the Interior Department entered negotiations to sell power, wheeled over Georgia Power's lines, to co-ops.[11]

Rural Electrification Administration carried forward its co-op-company integration program.[12] Administrator Ancher Nelsen weathered charges REA loans were used to lever such arrangements into being and continued to whittle down loan application backlog.

## The Year Ahead in Washington

- More Democratic investigations of partnership and utilities.
- Hells Canyon license will not be upset.
- Establishment of a government atomic insurance program.
- Establishment of a new bilateral program permitting export of American reactors and nuclear fuels.
- Congressional rejection of Hoover Commission power reforms.
- Passage of Upper Colorado Project Bill without Echo Park Dam.
- Hard fight on TVA Bond Financing Bills.

### References to 1955 Issues of Electrical World


1. 1/17 p9; 1/24 p 115; 4/4 p 184
2. 5/16 p 92; 8/15 p 8
3. 1/1 p 9
4. 7/18 p 8
5. 11/28 p 54; 12/5 p 00
6. 1/10 p 174; 3/7 p 79; 6/6 p 10; 4/11 p 9
7. 4/25 p 10; 5/2 p 45
8. 3/7 p 78
9. 3/7 p 75; 3/14 p 8; 3/28 p 9; 4/4 p 175; 6/27 p 90; 12/5 p 00
10. 9/5 p 66
11. 10/24 p 8
12. 5/9 p 10
13. 3/28 p 10; 6/27 p 89
14. 9/26 p 10; 11/7 p 10
15. 4/18 p 102

PROJECT SERVICES . . .
SPEED STATION CONSTRUCTION

**NEW DELTA STATION,** 210,000-kw addition to MP&L's system, demonstrates progressive thinking by one of America's enterprising electric utilities.

# Mississippi Power & Light adds 210,000 kw to system with all G-E Delta steam plant

Helping to meet the unprecedented demand for electric power in the South, Mississippi Power & Light's new Delta steam-electric station is now supplying 210,000 kw. The new plant, largest ever built in Mississippi, reflects progressive thinking and advance system planning.

Electrical apparatus was supplied by General Electric, after selection by MP&L and Ebasco Services, the consulting engineers. A G-E project team, composed of Sales, Engineering, and Product specialists assigned to the project, gave valuable assistance in putting the station on the line.

Efficient coordination of design, production and shipment of all electric apparatus by this G-E team proved a significant factor in helping Ebasco virtually eliminate overtime and keep the total cost to MP&L within budget levels.

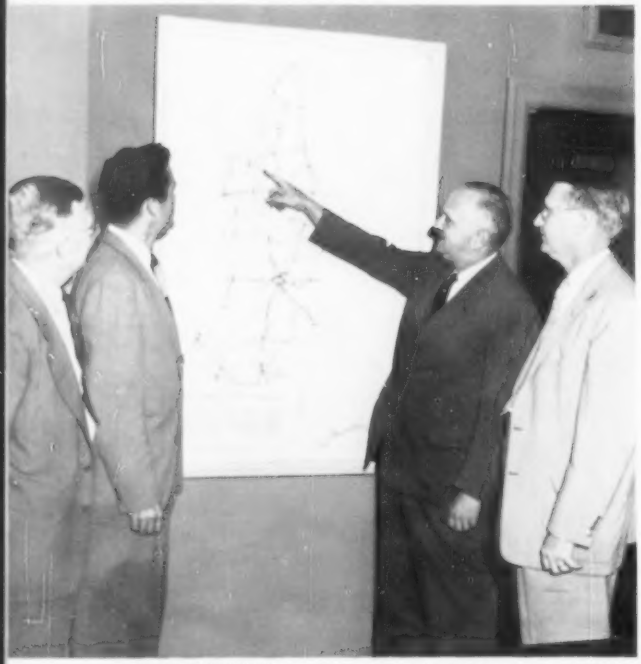
GENERAL ELECTRIC

*For More Station Data See Next Page* ▶

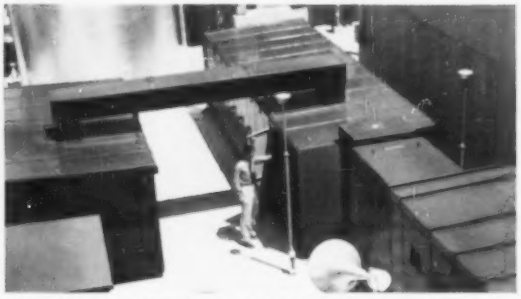
PROJECT SERVICES REPORT

**ON THE LINE** ahead of schedule, two 105,000-kw General Electric turbine-generators at the new Delta plant are helping meet state's growing need for electric power. Careful planning from the outset meant on-time manufacture, delivery, installation of all apparatus including the G.E.-equipped switchyard with power transformer and auxiliary power supply transformer shown here.

# G-E engineers team with Ebasco to meet

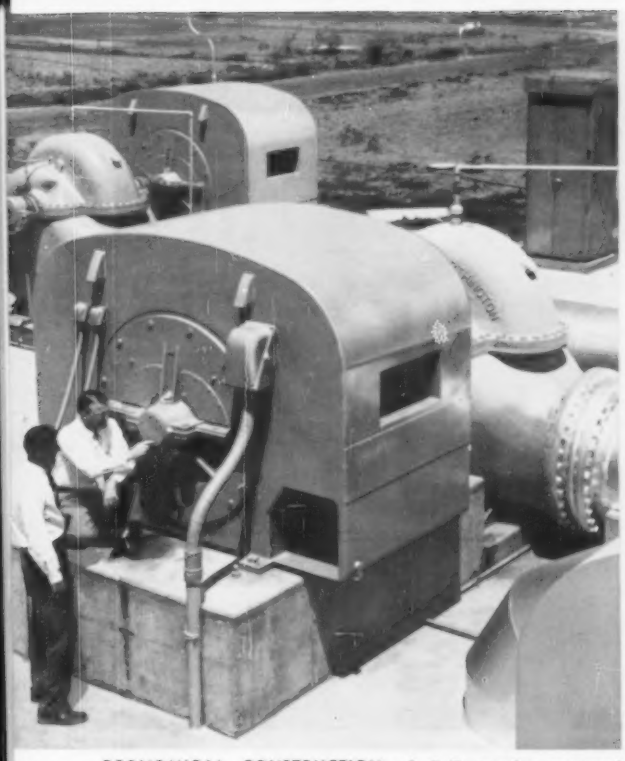


**LATEST THINKING** in station design highlights new Delta plant discussed here by (l to r) B. M. Davis, MP&L; R. H. Annin, G.E.; R. B. Wilson, MP&L President; T. R. Brock, G.E.

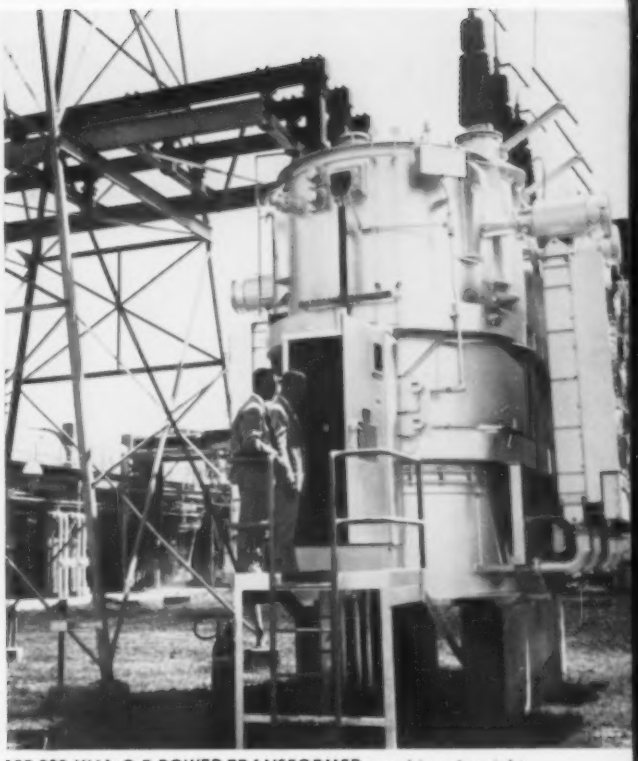


**WEATHER-PROTECTED UNIT SUBSTATION** with 480-volt duplex switchgear, which serves one of the two 105,000-kw turbine-generators, was designed to meet the needs of the Delta Station.

**COMPLETE SWITCHYARDS** including switchgear can be provided through G-E Project Services. T. R. Brock, G.E. and J. B. Fountain, MP&L discuss arrangement and design.



**ECONOMICAL CONSTRUCTION** of G-E weather-protected motors makes them excellent drives for these pumps. Here, design is checked by G.E.'s T. R. Brock and MP&L's D. C. Lutken.



**135,000-KVA G-E POWER TRANSFORMER** was shipped upright requiring field assembly of accessories only. Here, W. M. Prall, G.E., and J. B. Fountain, MP&L, inspect control accessories.

# slated start-up date for new MP&L station

## Application, design, manufacture, shipment of apparatus . . . all synchronized with plant's progress . . . eliminated costly delays

When Mississippi Power & Light and its consulting engineers, Ebasco Services, specified General Electric equipment for the Delta Station, a well-organized G-E engineering team went into action. As a result, valuable assistance helped speed construction and get the plant in full-time operation.

Recognizing the importance of early engineering decisions, G.E. aided Ebasco in finalizing the design characteristics of each item of G-E electric apparatus. Based on these decisions, G-E engineers were able to schedule manufacture, coordinate shipment; and thus assure delivery at plant site precisely as needed. Further aid was given in supervision of equipment installation. This efficient teamwork helped place Mississippi's largest single industrial project in operation on schedule and helped keep the total cost within the scope of MP&L's sound financial planning.

Similar teamwork, combining the utility, its consulting engineer and the G-E team of sales engineer, product specialists, application engineers, order service co-ordinators, and field service engineers can also save you time, money and man-hours. Here's how it's done:

**Simplify ordering of equipment,** purchased either directly, or through your consulting engineers, or through a machinery manufacturer.

**Conserve engineering time** by handling electrical details which frees you and your consulting engineer for other urgent problems.

**Integrate equipment design** to assure the maximum flexibility and effectiveness of plant operation.

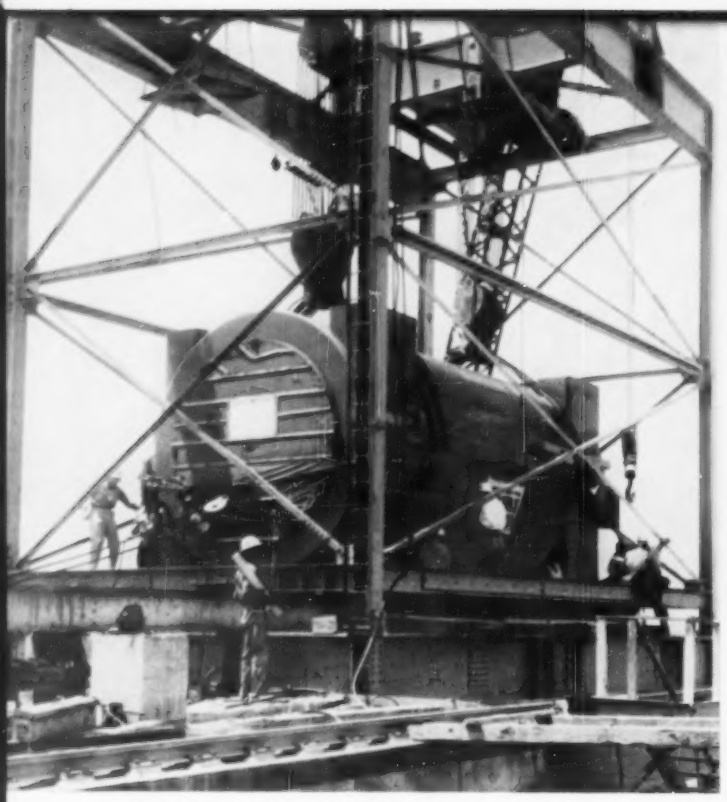
**Speed construction** by scheduling the arrival of equipment for maximum installation efficiency.

**Assist in installation and in training operators** to assure minimum start-up time and better understanding of the full operating capabilities of the equipment.

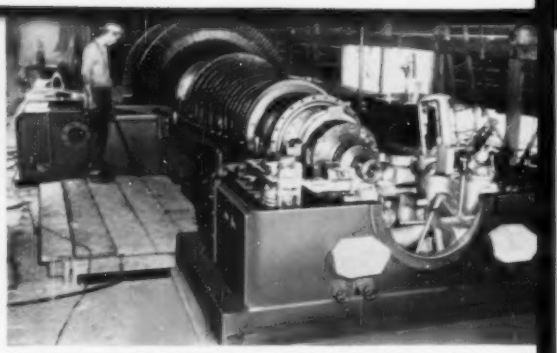
For details contact your G-E Apparatus Sales Representative, or write to Section 302-8, General Electric Company, Schenectady 5, N. Y.

***More Power to America***

**GENERAL ELECTRIC**



**POSITIONING OF TURBINE-GENERATOR,** by the field service engineer assigned to your station, is one of many "follow-through" advantages gained through the use of General Electric Project Services.



**CAREFUL SUPERVISION** of installation of the rotor in this 105,000-kw G-E unit at the Delta Station was aided by a field service engineer member of a G-E Project team.

**CHECKING PERFORMANCE** on-the-line is a G-E field service engineer activity that you can obtain through Project Services.

## Another "follow-through" of G-E Project Services . . .

# G-E field service engineers will supervise installation and start-up of your apparatus

When G-E equipment has reached your plant site, a G-E field service engineer is on the job to help oversee the placement, connection, and start-up of your apparatus investment. As a result, all the individual components of your new station or expanded plant are closely integrated with your over-all system for the best possible operation—as the G-E application engineer intended.

Field Service Engineering is just one of many Project Services on your job when you or your consultant specified G-E equipment. You can take advantage of all these services with G.E.:

**Application engineering** helps assure that all the items of electrical equipment are coordinated in design and operation.

**Product development** means you get equipment that incorporates latest design features.

**Field service engineering** means supervised installation, planned start-up, proper operation of equipment.

**Service engineering** helps keep plant operating at full capability, means training of operators, setting up of maintenance programs.

**Project coordination** helps assure proper selection, design, manufacture, delivery of your equipment without costly delays at installation time.

*More Power to America*

GENERAL ELECTRIC

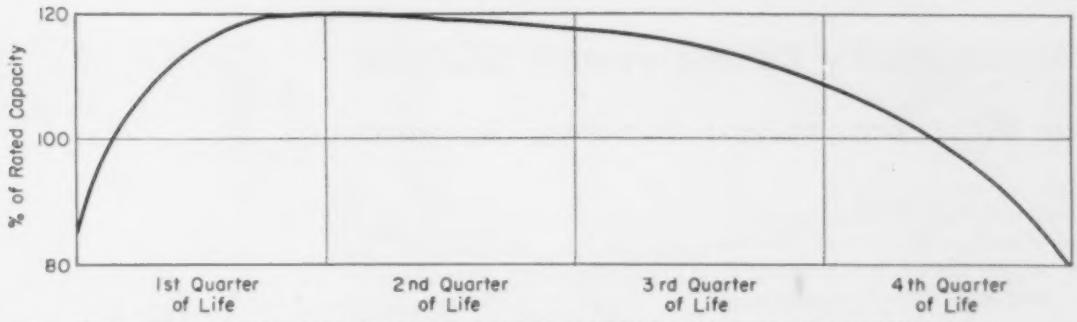



FIG 1—EXCESS CAPACITY OVER CATALOG CAPACITY RATING IS RELATED TO NORMAL SPAN OF BATTERY LIFE

# Two Curves Simplify Battery Life Tests

**SUBSTATION** Maintenance

**Specific gravity and temperature charts facilitate life tests no longer requiring adjustment of electrolyte to 1.275 sp gr**

**K. A. VAUGHAN,** National Service Manager, Gould-National Batteries, Inc., Trenton, N. J.

Specific gravity and temperature correction curves simplify check tests for determining the condition of batteries. Using such curves, plant and material handling engineers and battery-room superintendents perform tests no longer expensive and time consuming. The curves eliminate the necessity of adjusting the battery electrolyte to 1.275 sp gr in the fully charged condition.

Lives of a well and a poorly maintained battery may differ as much as 100%. For instance, a $1,600 industrial truck battery which lasts only four years costs $400 per year, but only $200 per year when it lasts eight years. Accordingly, batteries in use several years should be tested accurately for individual battery condition.

Fig 1 relates a battery's capacity to its life expectancy.

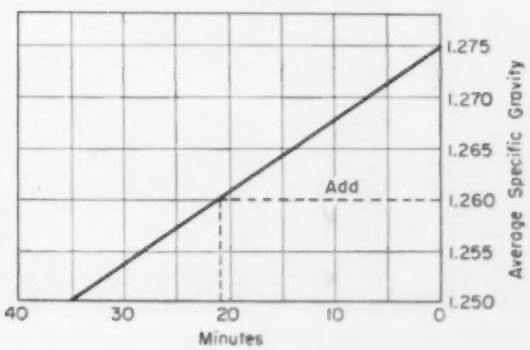



FIG 2—SPECIFIC GRAVITY correction curve for motive power battery is based on the battery's 6-hr rate of discharge

A test discharge provides the capacity from which the life can be determined. As battery capacity approaches 80%, its rate of decrease sharpens. When it falls below 80 to 85%, the battery should be watched carefully, and plans should be made for replacing it.

Testing procedure calls for giving the battery a normal charge at the usual rate, followed by an equalizing charge at the finishing rate. The latter charge is continued until the specific gravity of all individual cells ceases to increase and is uniform, not differing from each other more than 0.020 and none registering less than 1.250. The specific gravity of each cell is measured, and an average calculated. The electrolyte's average temperature is determined and recorded along with the room temperature.

As soon as practicable after the battery has been fully charged—never later than 16 hr—the test discharge should be started. Usually the battery is discharged at the 6-hr rate given on its nameplate. For example, a 600-amp-hr battery discharges at 100 amp for 6 hr.

The battery is discharged into a resistance load, such as a grid, carbon pile, or water-barrel discharge unit, its discharge rate being watched carefully and maintained steadily at the correct value. As the test progresses, voltage across each cell is read and recorded hourly to the fourth hour and every half hour thereafter. Starting time is accurately noted.

When the first cell shows a voltage of 1.75 v, the test discharge is stopped, and again the precise time is noted. Although it is assumed that all cells approach 1.75 v simultaneously, when one reaches that voltage before the others, it is shorted out of the battery circuit. Exact time of the shorting is recorded. One cell should be selected as a pilot. The voltage record of each cell over a 6-hr period signalizes the cell most likely to reach 1.75 v first.

The data obtained are sufficient for calculating the bat-

(*Continued on page* 90)

# NEW G-E AUTOMATIC

## Automatically Computes and Executes

## The Most Economical Loading Schedules

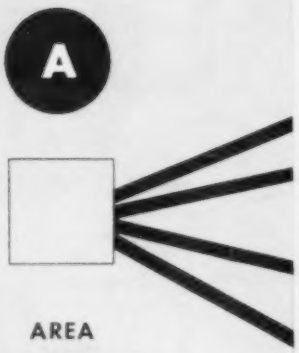
To help solve the problem of meeting power demand at the lowest possible cost, General Electric has developed a new, integrated system for automatic dispatching of generation.

**A RADICALLY IMPROVED SOLUTION** to the dispatch of an entire power system, the General Electric automatic dispatching system both computes and executes the most economical loading schedules. The costly, time-consuming job of detailed scheduling is completely eliminated.

**MINIMUM FUEL INPUT TO BOILERS** is assured because the most economical loading schedules, limited by practical conditions, are automatically computed and executed continuously.

**CO-ORDINATED CONTROL** is provided by the new G-E system because it automatically combines data handling, communication, computation, and routine supervision.

**FURTHER INFORMATION** may be obtained by contacting your nearest G-E Apparatus Sales Office, or write Section 585-13, General Electric Company, Schenectady 5, New York.




AREA DISPATCHING OFFICE

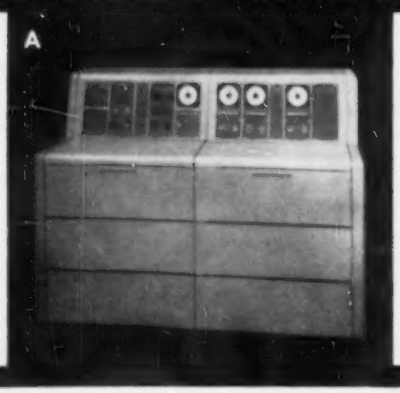
*Progress Is Our Most Important Product*

GENERAL ELECTRIC

MASTER AREA AND DISPATCHING CONSOLE

MASTER STATION AND MACHINE CONSOLE

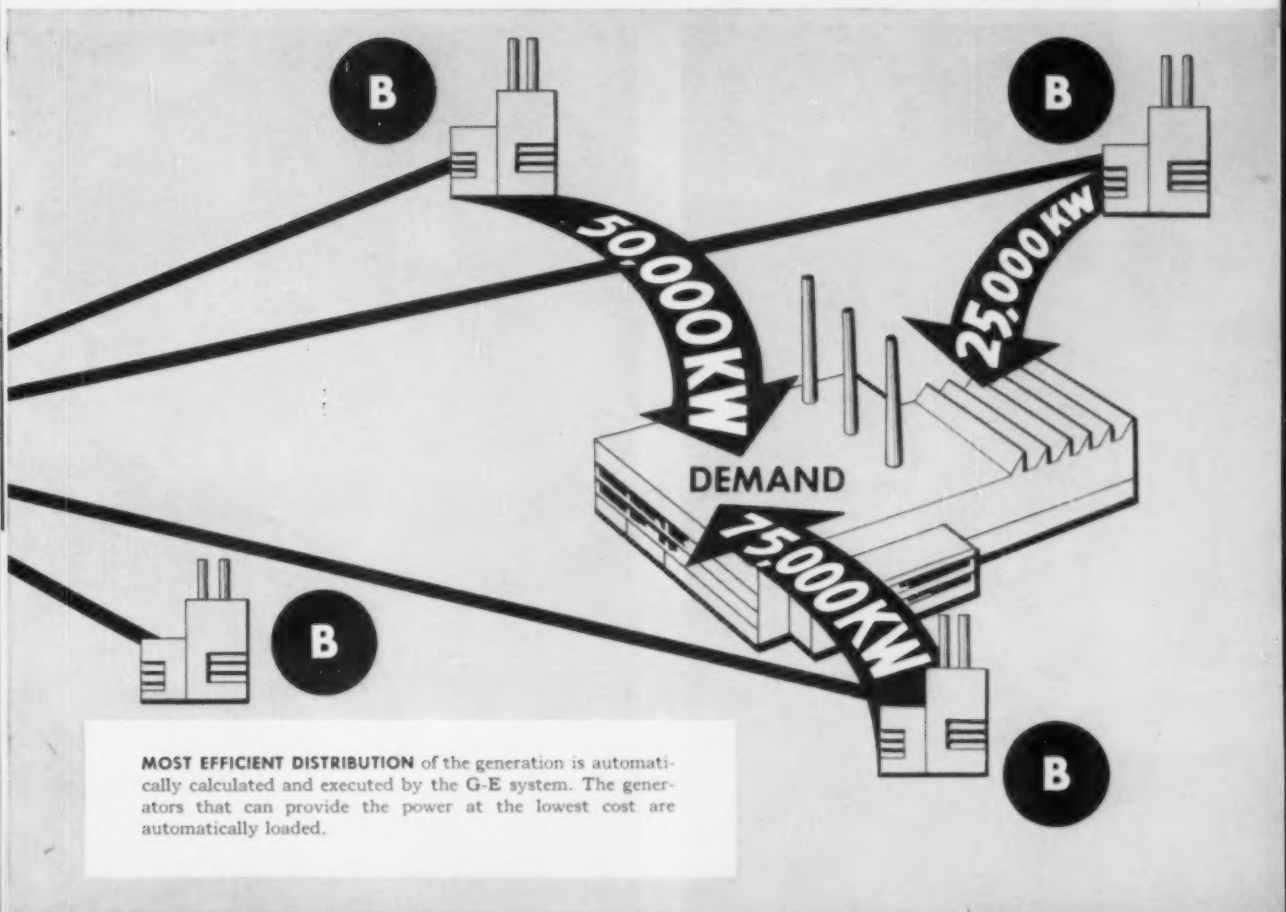
Here Are The Consoles That Make Up G.E.'s New System



**AT THE AREA DISPATCHER'S OFFICE** is located the master area and dispatching console. The master area console section develops the signal for the operating area. The dispatching section modifies this signal for each station to consider transmission losses.

**AT THE STATION** is located the master station and machine console. The master section provides all the adjustments for controlling the entire station. Controls for two machines, including incremental cost curve settings, are provided in each machine console section.

# DISPATCHING SYSTEM




**MOST EFFICIENT DISTRIBUTION** of the generation is automatically calculated and executed by the G-E system. The generators that can provide the power at the lowest cost are automatically loaded.

## KEY BENEFITS OF G-E SYSTEM

1. Most economical schedule is automatically computed and executed based on loading at equal incremental cost
2. Completely eliminates the need for detailed loading schedules
3. Addition or removal of machines does not require any readjustment of control equipment
4. Only one channel is required to control each generating station, thus relieving communication facilities
5. Transmission-loss penalty factors are easily applied to each station manually
6. No recorders are required as an integral part of the G-E automatic dispatching system
7. Panel space is not required because all components are mounted in consoles
8. Continuous and synchronized control is provided by the use of a highly accurate selsyn system

# old

Previous method of mounting had hanger support cemented to cutout housing.

# new

"U"-shaped bracket firmly bolted to cutout housing keeps porcelain under compression.

# ALL-NEW ENCLOSED FUSE CUTOUTS

# now...

## Strong, heavy hanger support on new G-E fuse cutout withstands roughest shocks

Once a fuse cutout is installed on a crossarm, it's important that it stays there—that's why in the new line of G-E enclosed fuse cutouts careful attention was given to the design of the hanger support.

G.E's new cutout hanger support can stand even the roughest shocks encountered in service. A "U"-shaped bracket firmly bolted to the cutout housing keeps the porcelain under compression assuring maximum mechanical strength.

Not only is G.E.'s new hanger support extra tough, it's extra durable! Each part of the bracket is pre-galvanized before assembly as an added safeguard against weathering.

This hanger construction is just one of the many features of G.E.'s new enclosed fuse cutout line. Other outstanding features include "V"-wedge contacts, safety-grip door handle and plastic-to-metal latching.

**EVERYTHING YOUR SYSTEM NEEDS.** G.E.'s new fuse cutout line gives you all functions—indicating-dropout, indicating-non-dropout, disconnect—in one basic design. You get two current ratings, 50 and 100 amperes, and two voltage ratings, 5.2 and 7.8 kv, to match every possible system demand. For a complete description of the new cutout line, write for Bulletin GEA-6208, General Electric Company, Section 433-11, Schenectady 5, N. Y.

**ENGINEERS AND LINEMEN AGREE**

The completely new line of G-E fuse cutouts has more of the features they prefer. There's good reason, too—the new design incorporates suggestions made by utility engineers and linemen to G-E sales engineers and specialists.

*Progress Is Our Most Important Product*

GENERAL ELECTRIC

tery's condition and its life expectancy. What remains to be determined is how close to 6 hr the battery maintained 1.75 v across each cell. This involves two corrections; one for the variation of the battery's specific gravity at the test's start from 1.275, and the other for the temperature above or below 77F. The correction curves, Figs 2 and 3, are read directly in minutes. Minutes are added to correct for specific gravity but are either added or subtracted to correct for temperature.

Use of these curves is illustrated by assuming a battery discharged at the 6-hr rate at a cell voltage above 1.75 v per cell for 345 min. At the start its specific gravity was 1.260, its temperature 90F. Fig 2 shows that for 1.260 sp gr 21 min should be added to the test's elapsed time, Fig 3 that 9 min should be subtracted for the 90F temperature. A battery having 100% capacity discharges at the required rate for a full 360 min. Hence, division of 357 by 360 min puts the corrected efficiency at 99.16% so that the battery is obviously in good condition and will not need early replacement.

Similarly, suppose a battery reached terminal voltage at the end of 305 min from a start at 1.269 sp gr and 59F average cell temperature. Fig 2 gives 21 min to be added, and Fig 3 19 min to be added. Hence the corrected elapsed time of the discharge is 345 min. Dividing 345 by 360 min gives a capacity of 95.8% so that this battery has many more months of life.

This would not be true of a battery reaching terminal voltage in 270 min, after starting at 1.260 sp gr and 105F. Fig 2 indicates that 21 min be added, and Fig 3 that 24 min be subtracted. The sum, 267 min, divided by 360 min gives a capacity of only 74%. This battery should be replaced.

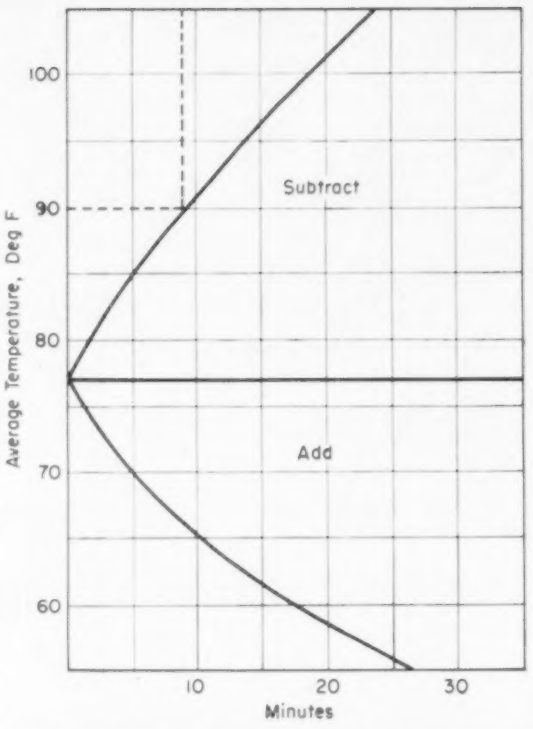



**FIG 3—TEMPERATURE correction curve for motive power battery is established on a battery's 6-hr rate of discharge**

**TRANSMISSION**—Operation

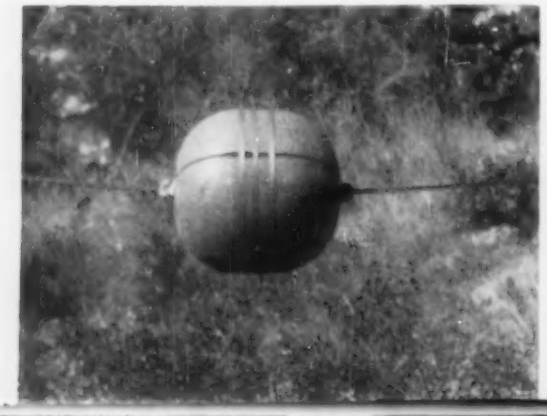
# Aircraft Warning Cable Spans Remote Creek

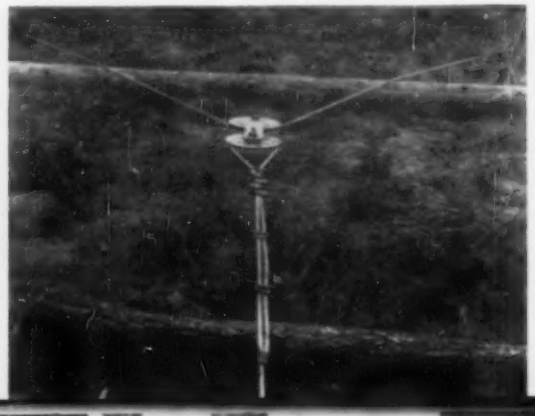
**JAMES J. HANSEN**, Engineer, Idaho Power Co, Boise

Installation of an aircraft warning span across a deep canyon in a remote, mountainous area was accomplished by pulling in cable from both ends of the span and splicing it in the middle. This procedure used on an Idaho Power Co line not only speeded up the job but also reduced the number of men and vehicles required for the installation.

The warning installation was made across Panther Creek in the rugged mountains of central Idaho, where a 69-kv circuit spans 5,178 ft across the creek. The circuit consists of four $\frac{5}{8}$-in. EHS copper-clad conductors, three phases and a spare.

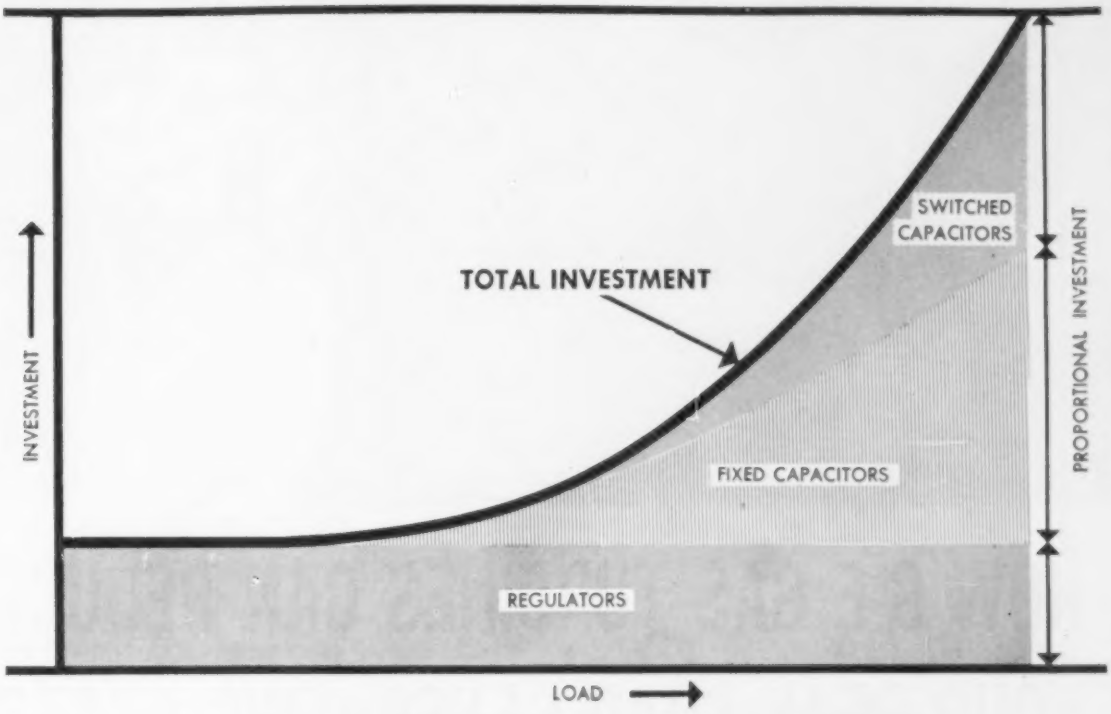
(*Continued on page* 94)





# OPERATION VOLTAGE REPORT NO. 4

## Key facts for the optimum investment for regulation



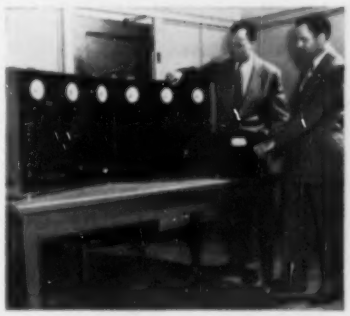

## Conclusion; DEFER NEW LINE INVESTMENT BY USING REGULATORS *PLUS* CAPACITORS

It has been established by a comprehensive study of the voltage problem that a combination of regulators and capacitors does the best job of holding voltage . . . and at a lower cost, too. To utility planners, the results of this study are a guide to programmed expenditures for retaining desirable consumer voltages as loads increase.

A suggested program for equipment procurement is shown above. Ideally, an investment in feeder voltage regulators should predominate at light loads and hence these should be purchased initially. As more load is added, fixed capacitors should be utilized to increase load capability. Finally, at heavy loads, switched capacitors should be added along with more fixed units. The greater investment at these heavier loadings should be in such power-factor improving equipment.

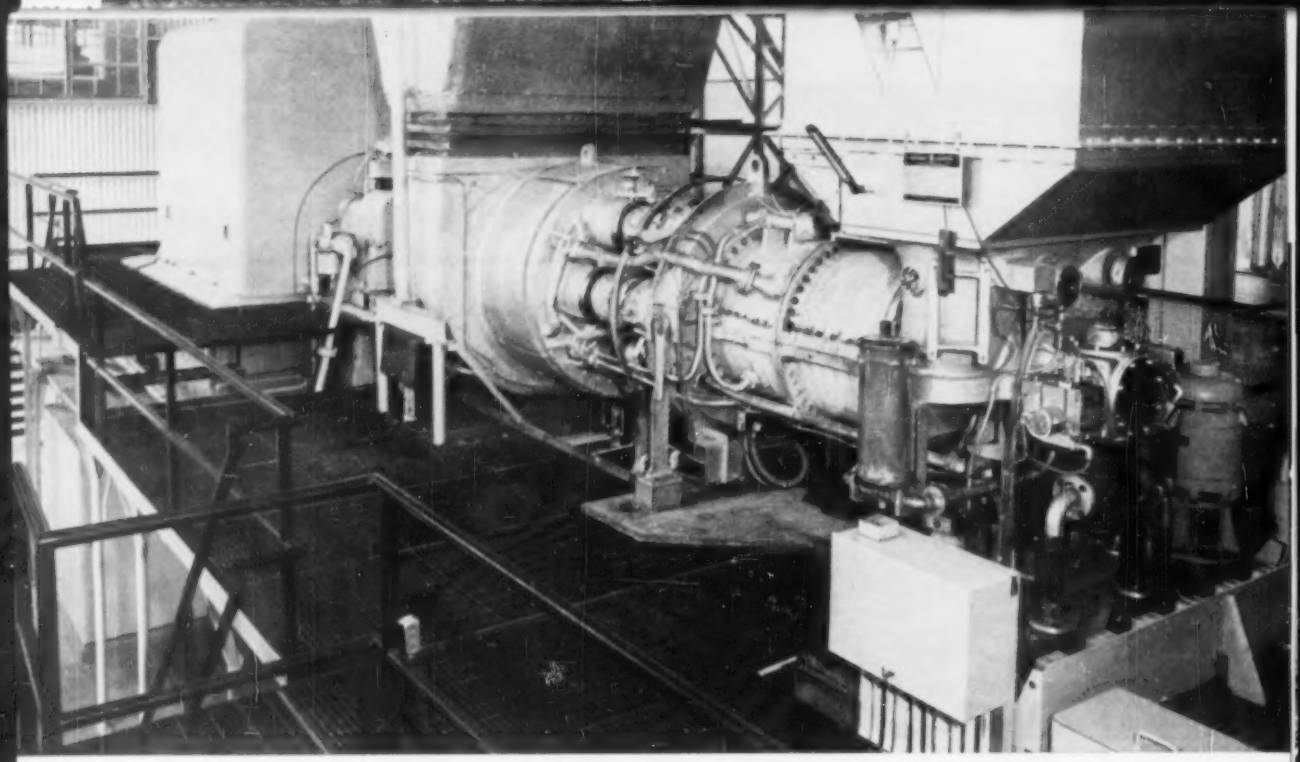
Only when thermal limitations or excessive line losses appear, should it be necessary to rebuild the line. The result is that costly line reconstruction is delayed until absolutely necessary, and consumers continue to get good voltage.

This is the last in a series of reports designed to acquaint you with the results of Operation Voltage. For a complete discussion, contact your G-E Apparatus Sales Engineer or write for GER-1029. General Electric Company, Schenectady 5, N. Y. 645-4

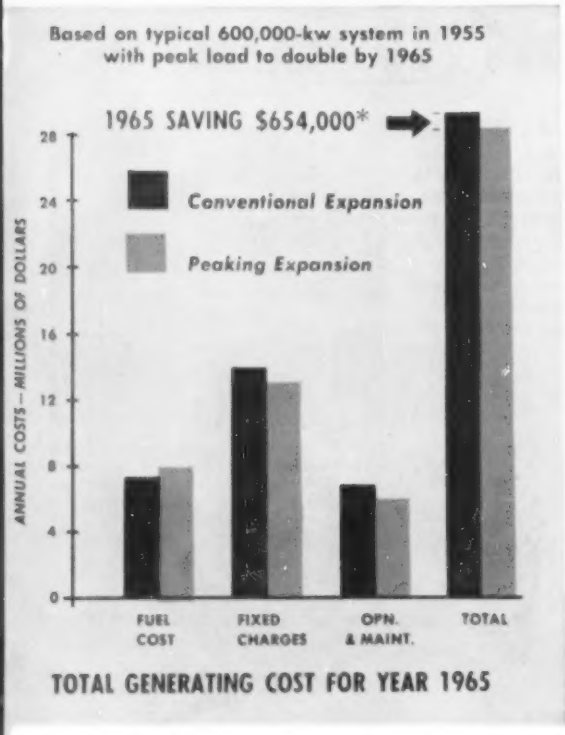


**Portable demonstrator being used by G-E engineers R. M. Butler and D. R. Samson to show effects of capacitors and regulators under variety of feeder load conditions.**

GENERAL ELECTRIC



# HOW G-E GAS TURBINES CAN REDUCE YOUR PEAK LOAD GENERATING COSTS

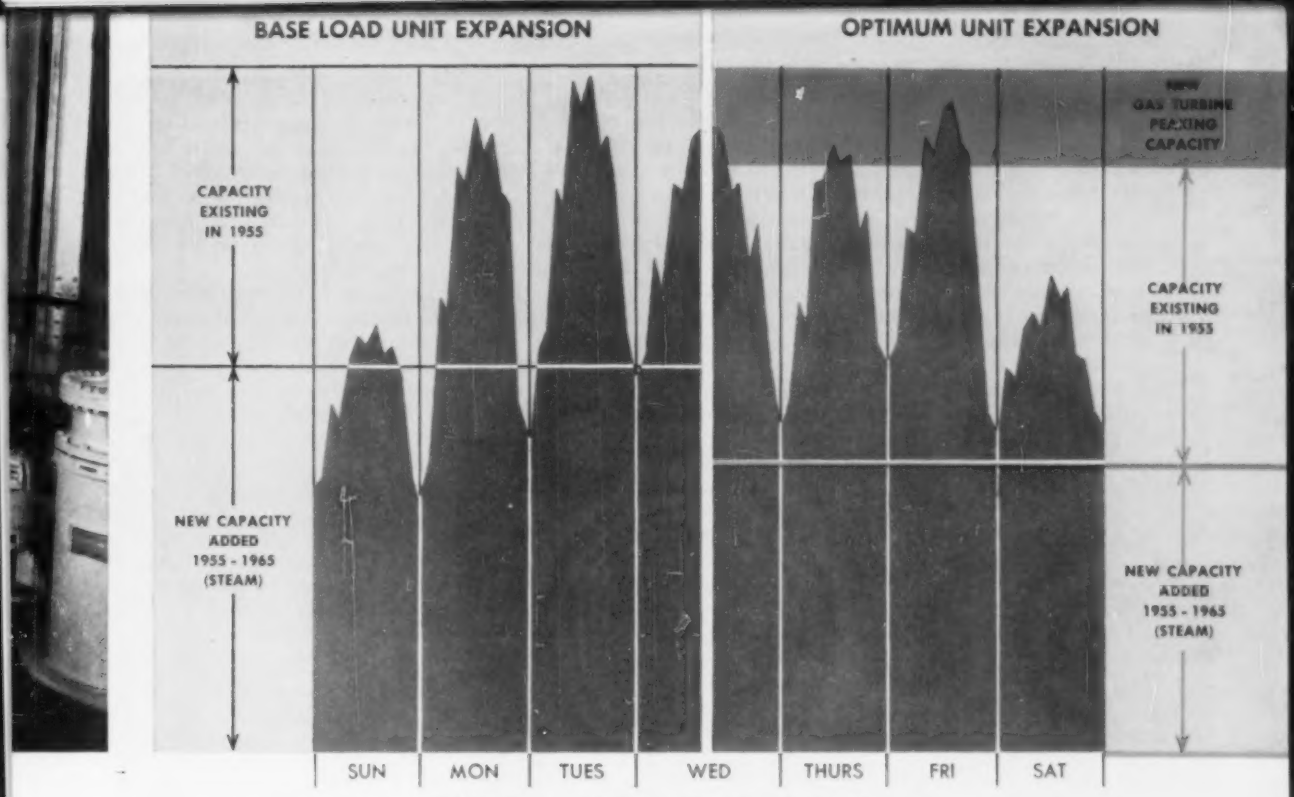



## Growing peak loads point up need for this new capacity expansion plan

Throughout the nation, rapidly growing peak loads are posing serious problems for utilities. For instance, increased use of home and commercial air conditioning is largely responsible for a summer peak in the South which is now growing at twice the rate of the average peak. Skyrocketing sales of air conditioning equipment in the Northern sections indicate that utilities there will soon face similar problems. These growing peak loads point up the need for a careful examination of expansion plans.

**THE CONVENTIONAL METHOD** used by most utilities is the "base load unit expansion system." This system rests on the principle that the lowest total fuel cost results from operating the most efficient units on the base load portion of the system, and the least efficient on the peaking portion. All new capacity additions, consisting of high-efficiency steam turbines, are immediately placed in base load operation.

*Estimated saving.




TYPICAL 1965 LOAD CURVE

WEEK OF PEAK LOAD

**A NEW METHOD** of meeting increasing load demands is now receiving extensive study. It's called "optimum unit expansion" (see chart above). This method proposes that for any given system there is an optimum way to expand capacity, using both base load and low-cost gas turbine peaking units that will give the minimum total production cost, taking into account fuel, fixed charges, labor, and maintenance.

**UNDER THE "OPTIMUM UNIT EXPANSION" PLAN,** the normal and necessary expansion with steam turbines to cover increased base load requirements has been augmented by a small proportion of General Electric gas turbines used as peaking units. Because of the short duration of system peaks—100 to 500 hours a year—the efficiency of the peaking units is secondary to the major consideration—low installed cost per kilowatt. General Electric gas turbines may be installed from $20–$40 per kilowatt less than steam turbine peaking plants.

**WHAT CAN THIS MEAN IN SAVINGS?** The chart on the opposite page tells the story. By 1965 an *annual* saving of $654,000* would be possible for a typical 600,000-kw (1955) system using G-E gas turbine generators to handle peak loads as opposed to the conventional use of old steam turbine plants. This figure assumes that peak load will double by 1965 to 1,200,000 kw and that the assumed load duration curve does not change.

**TO OBTAIN THIS ESTIMATED SAVING,** three factors are taken into consideration: First, fuel cost is slightly higher for the gas turbine. Second, the G-E gas turbine reduces fixed charges because of its low installed cost. Finally, low labor and maintenance costs of the "optimum unit expansion" system give it a big advantage in savings.

Moreover, the "optimum unit expansion system" offers two additional areas for savings: First, strategic location of the gas turbine unit on a system can result in considerable savings in transmission lines. Second, remote-controlled gas turbine stations are feasible, thus helping to further reduce labor costs.

Obviously, this study is meaningful to you only in terms of your particular system. Load growth forecasts, fuel and labor costs, present equipment, and the nature of your load duration curve are all factors which would affect the over-all picture.

**GENERAL ELECTRIC WOULD BE GLAD** to discuss with you how your company can achieve maximum benefit from "optimum unit expansion." For more information, contact your nearest G-E Apparatus Sales Office, or write to General Electric Company, Section 261-11, Schenectady 5, New York.

*Progress Is Our Most Important Product*

GENERAL ELECTRIC

## Aircraft Warning

(*Continued from page 90*)

Each conductor is suspended from a heavy two-pole X-braced structure. The sag is 450 ft, the lowest point being 900 ft above the canyon floor.

The aircraft warning span consists of a ⅝-in. EHS copper-clad cable suspended 35-50 ft below the conductors. Attached to this cable are 21 cedar wood balls 20 in. in dia. They are placed on the cable in groups of three spaced 50 ft apart with 500-ft intervals between each group. For maximum visibility the balls are painted international orange. Cedar balls made in two sections for easy installation are secured to the cable with three steel bands. A bronze clip with a cutout square washer welded to it is placed on the down grade side of the cable to keep the ball in position.

The cable is deadended at ground level under the span at the center of the towers. The deadend consists of two 12-in. sheaves joined by two ½x4x22-in. steel straps. The cable deadends on one sheave and a ½-in. EHS galvanized steel cable runs through the other sheave back to two anchors on each side. Logs under the cable and deadend makeup keep it from riding on the ground.

Because of the inaccessibility of the terminals, it required about a day to move vehicles and material to each end of the span. Cable for the warning span was ordered on two reels. One reel of about 3,000 ft was pulled down from the hill by hand from the west terminal. The cable reached almost to the bottom of the canyon. Then the deadend was made at the west terminal. After cable from the other reel was pulled down the east side, the two cables were compression spliced at the bottom of the canyon.

While the cable was still on the ground, positions for the balls were chained out and marked. Pack horses were used in spotting the balls along the cable. During this operation, work went on at the east terminal to sag the cable.

As slack was slowly taken out of the cable, the balls were attached as their marked positions on the cable cleared the ground. It required two days to get the balls located and attached. After all balls had been attached, the cable was pulled up to sag with a winch line from a 6 x 6 truck through five blocks to a sling with two grips on the cable. When the cable was sagged within about 50 ft of the conductors at the center of the span, it was cut and deadended in the same manner as the west terminal. Seven men in the contractor's crew did the job in nine days.

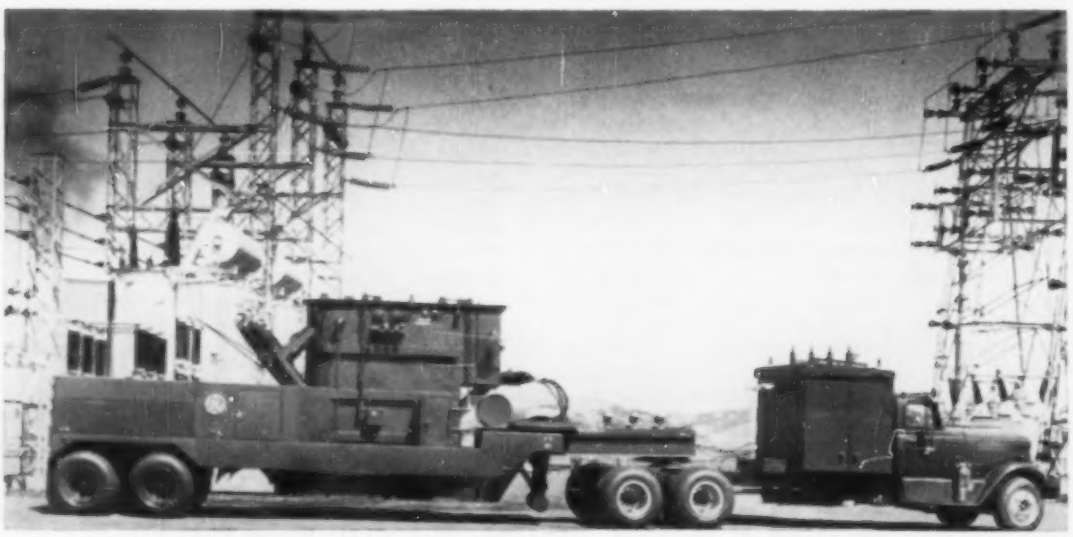
**SUBSTATION**—Design

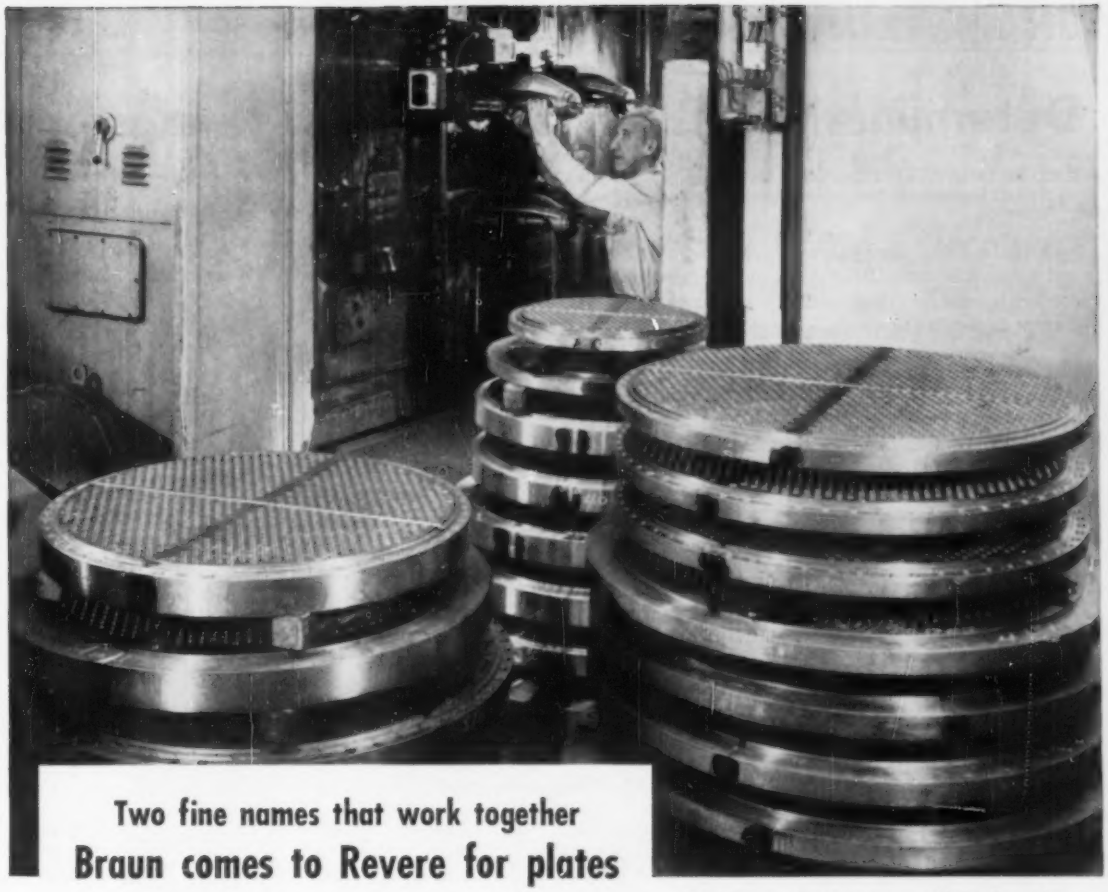
# Keep Rating Up, Weight Down in Mobile Sub

R. F. STUART, Senior Substation Engineer, Pacific Gas & Electric Co, San Francisco, Calif.

Liberal use of aluminum and utilization of the tractor as the permanent carrier for the low-voltage switchgear permitted Pacific Gas & Electric Co to design a 4,500-kva mobile substation within the limits of the California State Vehicle Code. Recently placed in service, this unit is rated 60000 Gr.Y - 4160 Y/2400x12480Y/7200, with automatic ± 10% tap-changing-underload. It is complete with high voltage fuses, low-voltage switchgear and relay protection. The new mobile substation, along with a smaller unit and a large mobile transformer, both recently acquired, in-

(*Continued on page 98*)





Tube sheets at 4-spindle automatic drill in Braun shop.

## Two fine names that work together

# Braun comes to Revere for plates

C. F. Braun & Co., Alhambra, Calif. is well known in the petroleum industry, the chemical industry, and other businesses in which heat transfer and fractionation are vital. Revere Copper and Brass Incorporated is well known in the non-ferrous metal industry for its tube sheets and plates, in all the customary alloys. What is more natural than the close relations between the two companies, Revere the supplier, Braun the fabricator? Revere can furnish heavy plates when needed; Braun is one of the great heavy-duty shops of the country. So far as transportation limits permit, Braun fabricates in its own plant; their machines and their cranes can handle anything the railroads can haul away. The same is true of Revere, which is likewise known throughout heavy industry for its ability to produce not only large plates, but also condenser and heat exchanger tubes.

Revere is pleased to be an important supplier to Braun. Remember, good names find it good business to come together. The next time you want quotations on tube sheets and plates, and condenser tubes, get in touch with the nearest Revere Sales Office.

A Braun engineer inspects a drilled tube sheet.

**REVERE**

**COPPER AND BRASS INCORPORATED**

*Founded by Paul Revere in 1801*

230 Park Avenue, New York 17, N. Y.

* * *

*Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N.Y. Sales Offices in Principal Cities, Distributors Everywhere.*

# Determination of Series Capacitor Ratings

R. E. MARBURY and ZENO NERI, Switchgear Distribution Apparatus Engineering Dept., Westinghouse Electric Corp., East Pittsburgh, Pa.

Series capacitors are rated in capacitive reactance (ohms) and continuous current-carrying capacity (amperes). The continuous current rating is usually greater than full load current in the line to satisfy other requirements.

**A. Capacitive Reactance.**

When circuit constants and load are known, improvement in voltage which can be realized for different values of $X_c$ can be calculated. Values chosen should be the smallest which will give satisfactory results.

**B. Current Rating.**

Current rating of a series capacitor should be chosen so that the following limits are never exceeded:

1. Sustained current should not exceed 110% of the capacitor rating.

2. Momentary current from energizing line, starting motors, etc., should never produce enough voltage across capacitor to cause gap breakdown. Gap breakdown should be at least 25% above such values.

**C. Voltage Rating.**

Voltage rating of the series capacitor should be determined by the following procedure:

1. Multiply required capacitive reactance by maximum expected sustained current.

2. Multiply required capacitive reactance by 1.25 and by maximum expected momentary current. In turn divide this figure by 2.5.

Voltage rating of the series capacitor will be equal to the greater of values calculated in steps 1 or 2. Once this value has been determined refer to Table 1, column 1. A sufficient number of capacitor units should be used in parallel to obtain desired total reactance per phase.

**D. Short-time Voltage Rating.**

Because instantaneous currents produce voltage peaks of short duration, a series capacitor having a given continuous voltage rating may be subjected to higher voltages for periods as indicated in Table 2.

Experience has shown a desirable limit to be 2.5 times normal voltage on capacitors when used as series capacitors to avoid possibility of damage to working dielectric.

To limit voltage, some form of a gap is usually connected in parallel with capacitor. When capacitor is protected by a gap, the gap should be set to have a breakdown not exceeding 2.5 times the continuous voltage rating of the capacitor. Also maximum transient operating current should not be higher than 75% of the value which when multiplied by $X_c$ will produce a voltage likely to break down the gap.

Any series capacitor protector, in addition to the gap, must have some device for terminating gap current once the gap has been flashed by high voltage on the capacitor. This device may be an electrically operated breaker, a spring-closed switch to short the capacitor, or compressed air to deionize the gap where instantaneous re-insertion is required.

Principle of Operation and Applications of Series Capacitors appeared in Electrical World, Dec. 12, 1955, page 132.

## Table 1. Preferred Series Capacitor Unit Ratings

| Capacitor Unit, rated voltage | Rated kvar | Capacitive Reactance, $X_c$ ohms | Rated Current, amp |
|---|---|---|---|
| 216 | 5 | 9.33 | 23.2 |
| 216 | 7.5 | 6.20 | 34.7 |
| 216 | 13.5 | 3.59 | 60.2 |
| 240 | 5 | 11.50 | 20.8 |
| 240 | 7.5 | 7.68 | 31.2 |
| 240 | 15 | 3.84 | 62.5 |
| 480 | 10 | 23.0 | 20.8 |
| 480 | 15 | 15.4 | 31.2 |
| 600 | 10 | 36.0 | 16.7 |
| 600 | 15 | 24.0 | 25 |
| 2400 | 15 | 384 | 6.25 |
| 2400 | 25 | 231 | 10.4 |
| 2770 | 25 | 307 | 9.03 |
| 3320 | 25 | 441 | 7.54 |
| 4160 | 15 | 1155 | 3.60 |
| 4160 | 25 | 693 | 6.10 |
| 4800 | 15 | 1537 | 3.12 |
| 4800 | 25 | 921 | 5.21 |
| 6640 | 25 | 1760 | 3.77 |
| 7200 | 15 | 3470 | 2.08 |
| 7200 | 25 | 2070 | 3.47 |
| 7600 | 15 | 3870 | 1.97 |
| 7600 | 25 | 2320 | 3.28 |
| 7960 | 15 | 4230 | 1.88 |
| 7960 | 25 | 2540 | 3.14 |

## Table 2. Higher Voltage Limits for Series Capacitors

(Multiplying factor times rated RMS voltage)

| Duration | Factor |
|---|---|
| 0.5 cycle | 4.8 |
| 1 cycle | 4.2 |
| 6 cycles | 3.05 |
| 15 cycles | 2.6 |
| 1 second | 2.2 |
| 15 seconds | 1.8 |
| 1 minute | 1.7 |
| 5 minutes | 1.5 |
| 30 minutes | 1.35 |

# 3 BIG REASONS WHY YOU'LL WIN WITH FARGO AUTOMATIC LINE SPLICES *for ALUMINUM and COPPER*

**1** — **THEY'RE PERMANENT** . . . all the parts equal or surpass the weather-ability of conductors . . . connections have full strength of the wires . . . provide joint resistance lower than equal length of conductor

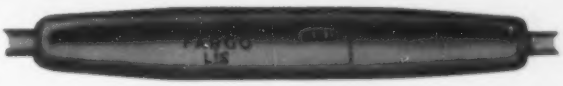
**2** — **THEY'RE SAFE** . . . require no extra tools to install . . . ample safety zone at back of jaws readily accommodates burred ends of wire assuring full surface grip on conductors.

**3** — **THEY'RE ECONOMICAL** . . . automatic one-piece jaw assures quick, easy installation . . . sag guide helps linemen sag lines properly . . . service records prove their lower over-all cost!

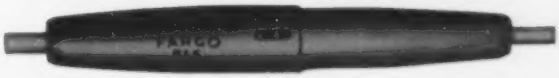
## EXCLUSIVE 1-PIECE JAW CAN'T GET OUT OF ALIGNMENT

**The heart of every Fargo Automatic Line Splice is this exclusive one-piece jaw machined from solid bar stock. In contrast to other types composed of four or more parts, this unique unit simply cannot get out of alignment. From the first all-important grip every installation step is quick and positive — saves time and costs. Jaws for all aluminum and AAAC splices machined from special aluminum alloys.**

Ask your Line Material Field Engineer for complete details.

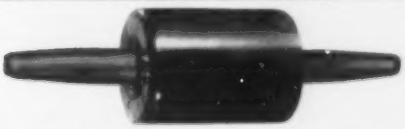



LS Series — for straight line splicing

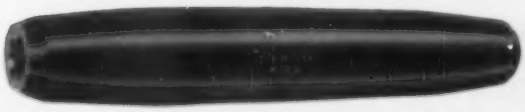



RLS Series — for splicing conductors of different sizes.

ALS Series — for straight line splicing — Aluminum
NDLS Series — for straight line splicing — AAAC



SFT — SFO Series for series street lighting and secondary breaks



AMS Series — for splicing Copperweld guys and messengers.

Manufactured by
**FARGO MFG. COMPANY, INC.**
Poughkeepsie
New York

FARGO

Distributed by
**LINE MATERIAL COMPANY**
(A McGraw Electric Company Division)
Milwaukee, Wisconsin

LM

## Mobile Substation

(*Continued from page 94*)

creases to five the number of mobile units on the wide-spread system.

Capacity of the 4,500-kva unit was determined solely on the basis of obtaining the maximum rating that could be built while adhering to weights and dimensions allowed under the vehicle code. In so doing, no sacrifice was made of features found necessary from past experience to provide reliable service, good voltage, ample protection and quick installation (See EW, Oct. 19, 1953, pg 150).

To keep total weight down, liberal use was made of aluminum and aluminum alloys in such equipment as air switch bases, racking devices, braces, shields, floors plates and wheels of the trailer and tractor. In the transformer proper about 14 cu ft of a foam type plastic (Strux) was used to displace about 700 lb of insulating oil. This material was attached, at several points, to the underside of the transformer cover. The plastic weighs 6.5 lb/cu ft as against 55.8 lb for an equivalent volume of oil.

Total weight was held down by specifying a three-legged three-phase core type transformer without a tertiary winding. Advantage was taken of the fact that this design behaves somewhat as if it had a fictitious delta winding. Actual field tests determined that harmonic voltages were negligible.

To spread the weight of the equipment over five axles and 18 wheels, the low-voltage switchgear and protective relays were mounted in a separate housing on the tractor just aft of the cab. This arrangement, plus the long wheelbase of the tractor, provided a ready means of dividing the load. The housing also is used to store spare high voltage fuses and miscellaneous items that must be removed for travel.

The power circuit between the transformer and switch housing consists of 15-kv, rubber-insulated, neoprene-jacketed, non-shielded, flexible cable that is held on a demountable intermediate support. Control cables are multi-conductor with plug-in connectors. All cables are removed and stowed during transit.

Experience thus far with this large unit has resulted in only minor specification changes for another similar unit now on order. However, from the knowledge gained, it appears that further weight reductions can be made, especially by greater use of aluminum. These weight reductions will be used to extend the primary winding to 70 kv and the rating to 5,000 kva for greater versatility.

**DISTRIBUTION**—Construction

# Boom Extension Aids Hole Digging At Hard-to-Reach Places

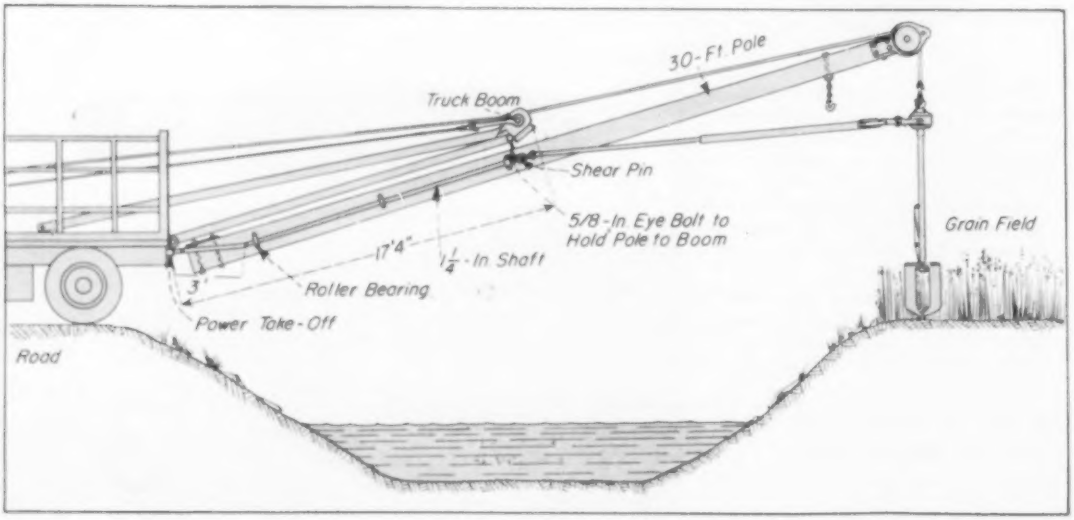
**ROBERT W. NYGARD**, District Manager, Devils Lake North Dakota Dist, Otter Tail Power Co.

A boom extension is being used by Otter Tail Power Co to facilitate digging holes and setting poles where the line location is not accessible from the highway. Moreover, where crops are growing up to the line location, use of the extension minimizes and often eliminates crop damage.

The extension consists of a specially equipped, 30-ft, class 4 pole attached to the rear of the truck and to the truck's boom. On one end of the pole is a 10-in. pulley for a winch line, which is used to raise and lower either the bucket-type digger or poles.

Power for the digger is provided from the truck's power take-off through universals and a shaft permanently mounted on the side of the pole. Bolted to the pole near the 10-in. pulley is a short piece of chain for holding the digger while poles are being set.

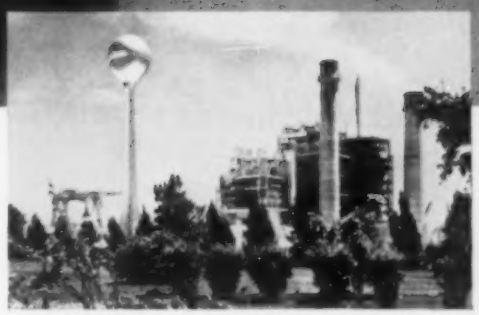
Joseph McNally, of the company's Devils Lake division, devised the boom extension.



# Nerve center

## OF THE GIANTS THAT POWER FLORIDA'S GROWTH

*Speedomax Telemeters help provide speed and accuracy in load frequency control at Florida Power & Light Company's Load Dispatcher's Office in the Ryan Building, Miami.*



*Cutler Plant, one of FP&L's eight plants controlled by L&N equipment.*

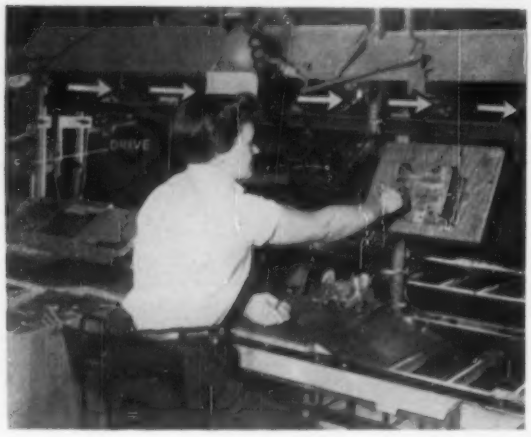
**Fast growing Florida Power & Light Company uses L&N automatic load frequency control equipment**

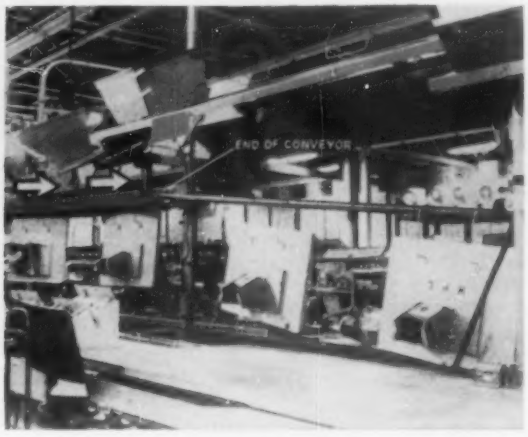
• Rapidly expanding Florida Power & Light Company is growing even faster than the expanding area which it serves . . . is in the 4th year of a $410,000,000 construction program to provide 1,662,000 KW capability by 1961.

Key part of FP&L's mammoth expansion program is the installation of finest equipment for maximum efficiency and lowest cost operation. Particularly vital is the fast, accurate L&N equipment that controls the ebb and flow of power to meet varying demand.

L&N Speedomax Telemeters offer many advantages: work well with telephone, microwave or carrier channel, over any distance the channel can span . . . can be supplied to retransmit, to integrate, to add up area generation, net interchange, etc. . . . work directly with L&N Load-Frequency Control, and are engineered as an integral part of system control.

Your Load Dispatcher's Office can profit from L&N equipment. For details, write to Leeds & Northrup Co., 4938 Stenton Avenue, Philadelphia 44, Penna.




# Pallet Conveyor Ends Production Delay

A screw-type conveyor that worms pallets back to the start of assembly lines has solved a manufacturing delay for Westinghouse Electric Corp's Radio and TV Div, Metuchen, N. J.

The radio-assembly benches, and space both overhead and in the aisle, already were packed with equipment. The rotating screw-type conveyor, driven by a ½-hp motor, thus was especially suitable because it required no return "loop" to a pulley, as a belt would have needed. The screw is 60 ft long, ¾-in. diam, and is made of flexible carbon steel.

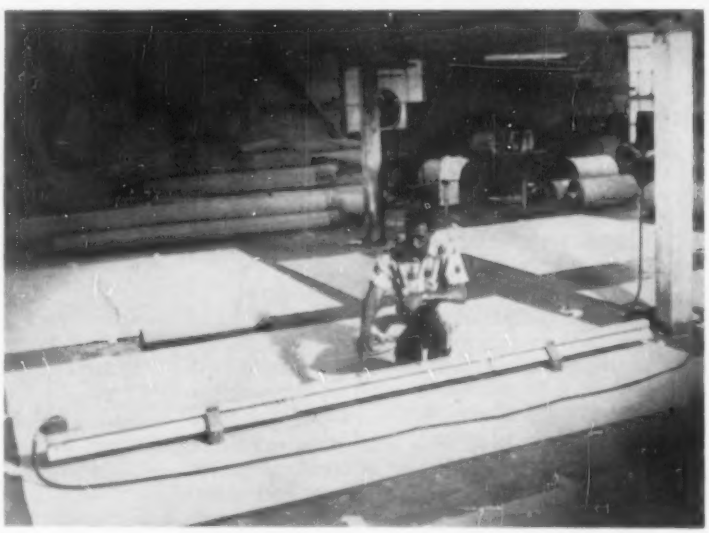
Workers hang empty pallets between threads on the exposed upper part. Pallets return at 12 fpm to the start of production. If the first assembler is not ready for the returned pallet, it slides onto a slick rail where four can accumulate. Production delays have been eliminated because pallets always are ready for instant and continuous use.

## Infrared Vulcanizes Carpet Tape

Latex-impregnated binding tape is being vulcanized on carpet seams in less than 3 min by a portable infrared dryer devised by Corona Equipment Co, Inc, for a Sears Roebuck & Co warehouse in Los Angeles.

Overnight curing also is eliminated. This time-wasting process was dependent upon weather conditions, and required that carpets be spread over a vast area. With the infrared heater, close regulation of temperature is possible. This is important because seams must be vulcanized quickly without scorching.

The portable dryer consists of four 1,250-w infrared heaters placed end-to-end in a 16-ft light aluminum channel. Legs were attached to space the heaters 2 in. above the carpet. Electricity is supplied through a 35-ft extension cord using a twist-lock plug for 240 v. A special infrared heater, which has a Pyrex glass tube, was selected because this glass remains relatively cool. This permits location of the heater closer to the work without danger of hot spots, or of creating fire hazards.



**CARPET BINDING TAPE is cured and vulcanized in 3 min with this infrared heater. Savings of time and space were realized, and weather effects were eliminated**

# How Careful Should You Be for 39¢?

Before this man was born, O-B was routinely testing 100 per cent of its pintype insulator production by flashover. Now, such testing is a requirement of national standards.

Inspecting today's output to reject today's errors goes only part way toward protecting the insulator buyer. Compare this to decades of testing history in the hands of an able technical organization anxious to improve its product. Long ago, before we *had to* apply total inspection we did it by *choice* on an insulator that, even now, sells for only 39 cents! Long ago, too, O-B users found they were spared the drudgery of roaming over country roads or up and down alleys on a stormy night looking for lightning-damaged insulators.

In the many years we have performed total inspection, the occasional rejects have gone direct to research men in the laboratory where lessons could be learned leading to a better product. In this way, protection for the buyer goes much further than merely throwing away and, perhaps, hoping to forget today's defective pieces.

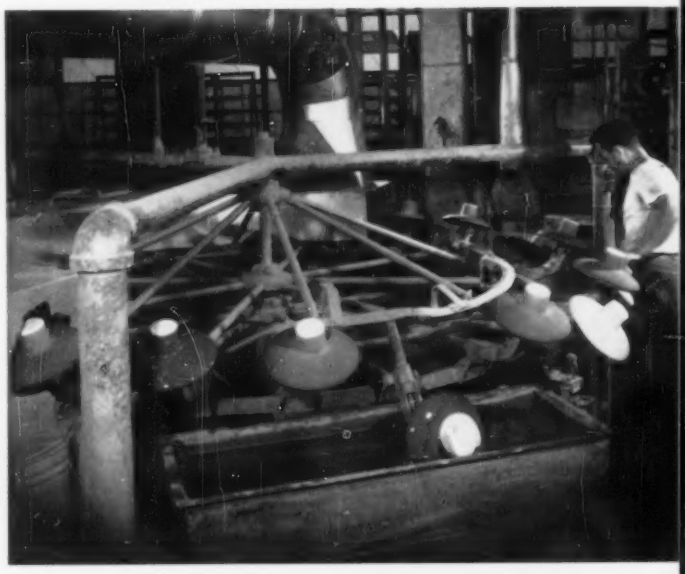
And it gives a lot more meaning to the question: "How careful should you be for 39 cents?"

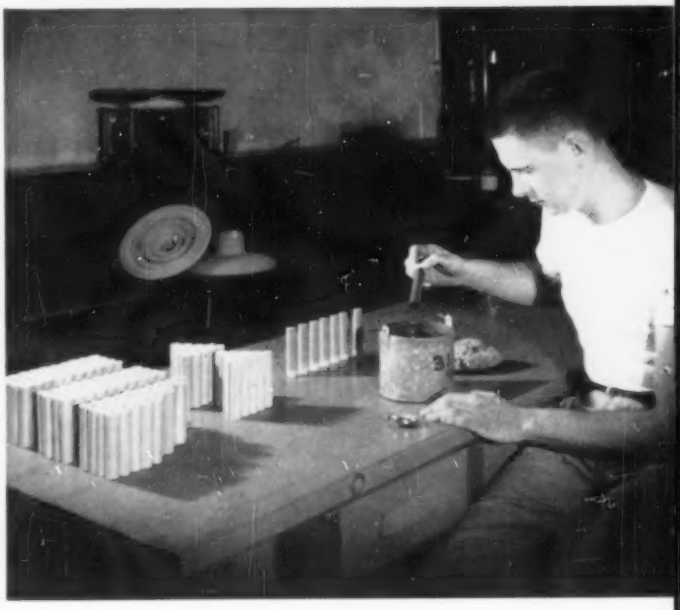
OHIO BRASS COMPANY, MANSFIELD, OHIO

In Canada—Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

TECHNICAL COMPETENCE the heart of every Ohio Brass insulator

# Putting An Extra Layer of





Glaze has certain minor advantages on an insulator. It resists accumulation of dirt because of its glossy surface. Its color sometimes permits you to identify a certain maker's product. But these are incidental to the big job it does. By controlled shrinkage, this thin skin is put under compression. By a combination of balanced compression, toughness, and adhesion to the porcelain base, a properly employed glaze can add 25 per cent or more to the strength of an insulator.

Note that we said, "properly employed." Thickness of the glaze, especially over critical areas of the insulator, must be accurately controlled. For 17 years (well over 20,000,000 O-B suspension insulators) this has been a precision operation in our plant. But it hasn't stood still these 17 years. It has probably seen as many detailed improvements as any process we have, and it is still a full-time job for a crew of highly trained technical men.

The story of precision glazing has too many ramifications to be told completely in a few pages, but some of its chapters may shed new light on the care we take in *just one step* of suspension insulator manufacture. It is another practical and valuable application of Technical Competence, the heart of every O-B insulator.

OHIO BRASS COMPANY, MANSFIELD, OHIO

In Canada—Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

# Strength On A Suspension Insulator

For brevity and clarity, we will tell the glazing story in reverse order; starting with the final step and working back toward how we control it. Here is the automatic glaze dipping machine which rotates the insulator disc during a timed dip in the glaze bath, then permits partial drying to avoid damage in handling. The original of this machine was built by us in 1938 and, in its 17 years of use, has seen many improvements. Since the speed of the machine is fixed, the dipping time is constant. Therefore, the characteristics of the glaze bath determine many of the physical aspects of the process. In order to attain exact thickness of the glaze coat, this process must be highly controlled.

We operate what has been called "a factory within a factory" -- an experimental pilot plant where every process is duplicated in small scale with special controls to permit either exactly matching or varying factory conditions. This manually controlled laboratory dipping machine may be adjusted to the same rpm speed as the factory equipment, and immersion time is controlled by a stop watch. Regular or experimental glazes, thus, may be applied under either standard or varied conditions. These insulators are fired in a special controlled-program kiln or in our regular plant equipment. Specimens are often fired both ways as a check.

Leaving the product, we take another step backwards into pure technical control. Size and shape of an insulator introduce variables in a strength study. Therefore, we use the simplest of shapes; small cylindrical test bars made to an exact standard of size, thus ruling out all but glaze variations. Dipping is done by hand under careful time control. Present glaze compositions are constantly checked and improvements often investigated. After firing, each bar is broken on a precision testing machine to determine the amount and consistency of strength imparted by the glaze coating. Thousands of such bars are always in process. In this practical way, a glaze composition is evaluated.

When a glaze has been compounded it has a thin, creamy consistency. This, however, cannot be a hit-or-miss condition. Remember that the factory dipping equipment runs at a constant speed. Accordingly, the amount of glaze picked up in a fixed dipping period depends greatly on the exact density of the glaze bath. To determine this, specific gravity and viscosity are both accurately measured; the first by weight determination and the second by precision instrument that rotates a disc in the solution and reads the "drag" imposed by the viscosity of the sample. By means of this test, the amount of glaze applied to an insulator may be accurately computed. We thus constantly exercise both qualitative and quantitative control over the precision operation of glaze application. This, in turn, permits us better to exploit the possibilities of high strength glazing techniques.

the heart of every Ohio Brass insulator

TC

# New Laboratory Founded for Advanced Ceramic Research

Pardon us for seeming poetic, but we've had a dream come true!

All of our technical men -- and we have a lot of mighty good ones -- have one problem that is practically a common denominator, namely, a telephone. Just as they may be digging deep into some worthwhile investigation, a kiln in the factory will go temperamental, or a process will break down, and off they go on the run. While this is generally accepted as part of a technical man's job in industry, it is no atmosphere for serious research.

Now, another complete and independent laboratory has been established in our organization. "Laboratory" is not truly descriptive. In all the word implies, it is an Ivory Tower. It is O-B's new Basic Ceramic Research Division. It is housed in its own private building, off-limits to most people. It is filled with new, elaborate equipment. Above all else has been the careful choice of technical background and ability of its personnel. It is free and totally detached from product design or factory operation.

We believe this organization is unique in our industry. It certainly is in size, equipment, scope, and man-power. Its one purpose is to conduct advanced theoretical research in the field of Ceramics, normally -- but not necessarily -- related to high voltage insulation.

Research in its pure form is not a common commodity. It borders on being a luxury -- one of those "luxuries" that have made American free enterprise what it is today! Every O-B insulator you use makes you a partner in this project, since its support can come only from the volume of business you and the rest of the electrical industry have directed toward our company.

OHIO BRASS COMPANY, MANSFIELD, OHIO

In Canada—Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

TECHNICAL COMPETENCE the heart of every Ohio Brass insulator

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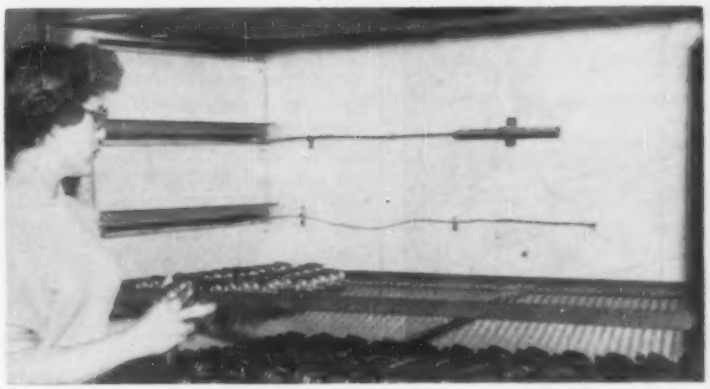


## Oven Dries Alumina Cores at Night

The alumina cores of filter dryers used in air conditioning systems are being dried by one 11-kw convection oven installed at Jefferson Products Co, Washington, Mo. Thermostatically controlled, the ovens dry the products at night so that the ovens are ready in the morning for the next day's production. The company has found electric heat to be satisfactory in core drying because it results in an extremely dry air conditoning system. Four 11-kw ovens and three 7-kw ovens have been installed. Two more were ordered. Robert Enkelmann, Industrial Engineer, Union Electric Co of Missouri, St. Louis.

## *INDUSTRIAL NEWS NOTES*

### No Sooty Shorts

Lindberg Engineering Co, Chicago, has developed an element for electric furnaces that works on an "extremely low voltage" that a man cannot feel. Made of large corrugated sheets of nickel chromium, the elements do not short-circuit when covered with soot deposited in rich atmospheres during carburizing or carbonitriding. The corrugations can be spaced to intensify heat in specific areas, and the elements can double as baffles in certain air-circulation systems.

•

### Robot Controls Can Help

Automatic controls can be applied to countless individual machines and processes by run-of-the-mill manufacturers who never will attain the glittery, completely automatic factory, reports Connecticut Light & Power Co. Resulting advantages: Increased productivity, uniform high-quality product, fewer rejects, less accidents, and lower unit costs. Biggest opportunity to save money may be in materials handling, which can add up to 50% of the product cost.

### Annealing Line Speeds Output

Strip steel is cleaned and annealed at the rate of 1,000 fpm at U.S. Steel's Fairless Works. Designed jointly by U.S. Steel, United Engineering and Foundry Co, and General Electric, the new cleaning and annealing line turns out 30 tons an hour. The large vertical furnace can handle strip up to 37 in. wide. Adjustable speed dc motors on a tension bridle help keep proper tension on the steel as it courses through the annealing line.

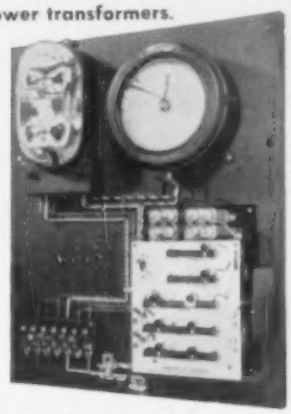
•

### More Money Saved

The Atlantic Steel Co of Atlanta, Ga., has added a second electric furnace to its productive facilities. General Electric Co, which built a 15,000 kva transformer to serve this furnace, reports that Atlantic Steel has found electric smelting to be more efficient than the open hearth process. Atlantic's first furnace produced 135,000 net tons of finished steel in 1954 using about 500 kwhr per ton. The new furnace will have a 75-ton capacity and will draw a maximum current of about 27,000 amp.

**Transformer Loss Compensator *Saves you Money!***

**BECAUSE it provides an accurate means of measuring the energy and demands of high-voltage services at the low-voltage side of the power transformers.**



*This installation at 2.3 kv saved about $2600 compared with 34.5 kv metering; it saves about $5500 over metering at 69 kv.*

**THE TESCO compensator adds to the registration of the watthour meter an amount equal to the sum of the iron and copper losses of the transformer bank. It may be used with practically any type of watthour meter and . . . importantly . . . no changes are made in the meter itself either structurally or in adjustments . . . It is produced in two and three element types for use with two-element or three-element meters on any type circuit.**

***Some of the Users . . .***

**Phila. Electric Co. Penna. Power & Light Co. Texas Power & Light Co. U. S. Bureau of Recl. Public Service Co. of New Hampshire. Utah Power & Light Co. Northern States Power Co.**

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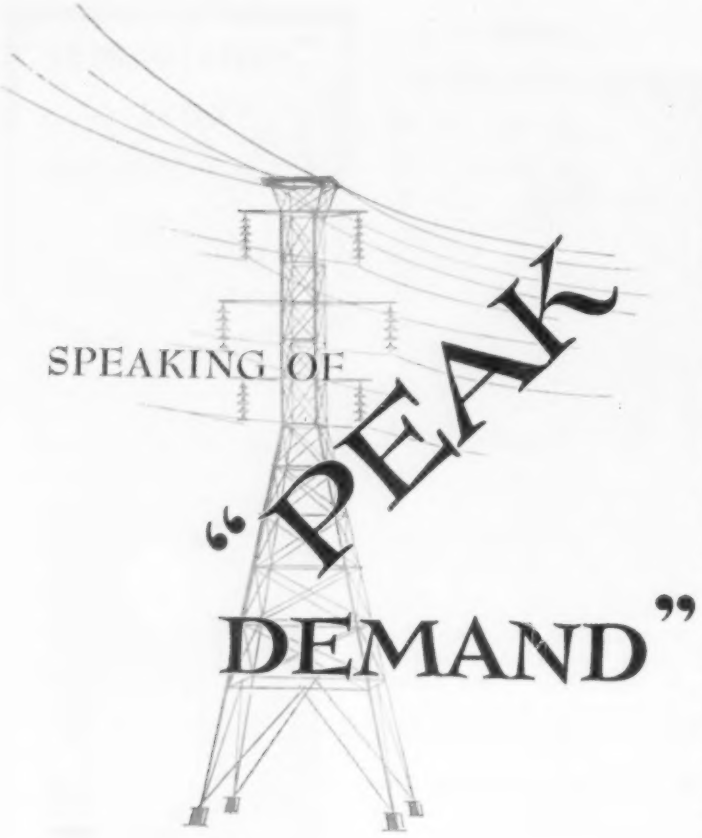


As utility companies have improved and expanded to meet ever-increasing demand, their need for sound financing has grown too.

To meet these specialized needs, more and more utilities turn to Guaranty Trust Company. By long and close association with utilities, our knowledge of the industry and its problems is also at an all-time peak today.

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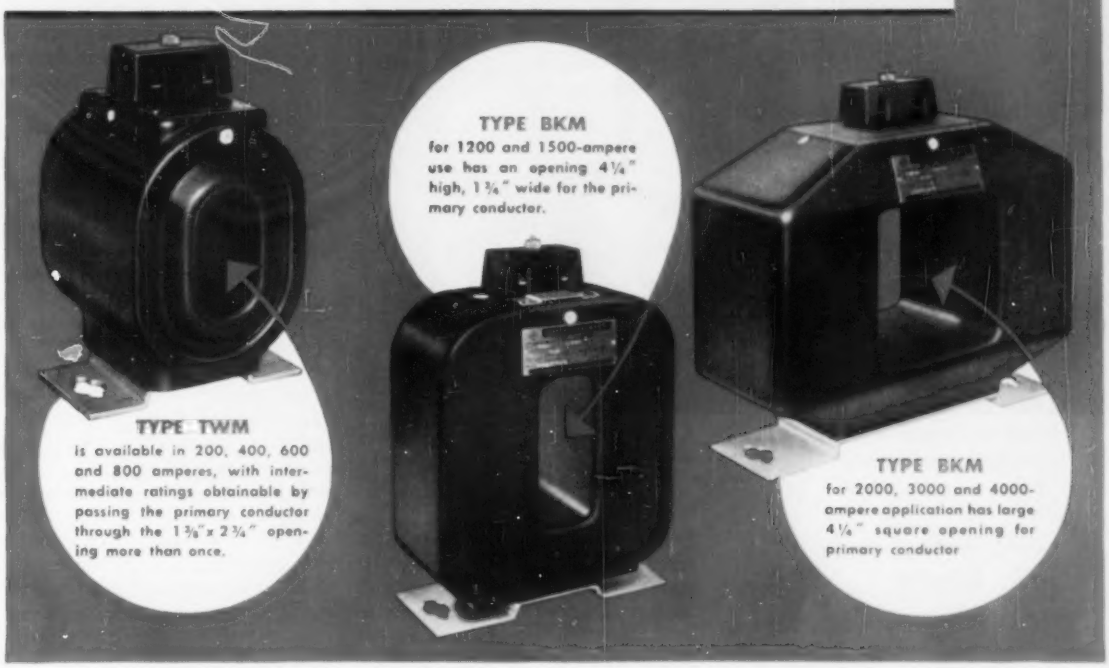
## INDUSTRIAL BRIEFS

**Lubricating dies** at the Lyons Die Casting Co in Kansas City, Mo., was a problem until electric heat was applied. The lubricant is sprayed on the dies. It is the consistency of butter or thick grease and is thinned to spraying consistency by heating. However, as it passed through a hose to the spray nozzle it cooled and thickened again. To stop this, coated resistance wire heaters were wrapped around the neoprene hose. The standard 80-ft, 400-w, 120-v heater cord was cut to 20-ft lengths to give 20-ft, 100-w, 30-v heaters. Small transformers, 120-240/30v, were installed to provide the required voltage for the heaters. One 100-w heater is required for each of the zinc alloy die casting machines. These heaters have eliminated the problems of properly applying lubricant to the dies. A. T. Gaulke, Power Sales Engineer, Kansas City Power & Light Co, Kansas City, Mo.

**Cutting heat treating time** has been effected with a 120-kw electric salt bath at Ajax Steel & Forge Co's plant in Detroit, with improved, non-scaling parts resulting. An overhead crane dunks into the pit-type bath extrusion rams, liners, die holders and other parts, some weighing 3,000 lb. These parts reach a drawing temperature of 1,050 F to 1,250 F uniformly and in half the time formerly required. P. C. LaMarre, The Detroit Edison Co, Detroit, Mich.

**Improved working conditions** resulted when Black & Decker Mfg. Co. at Hampstead, Md. installed a 72-kw electrically heated double-end forging furnace to improve the forging operation. Workers say that the area around this furnace is about 50 deg cooler than is ordinarily found in forging. The furnace can be worked from both ends simultaneously. Also long bar stock can be heated in the middle for an offset operation. The furnace has a maximum rating of 2,400 F and retains its heat so well that it requires no hood. The hearth area is over 5 sq ft, but because of good insulation and no stack losses the furnace can be held at the standby temperature of 1,400 F with less than 6 kw input. George H. Hoffman, Industrial Power Dept., Baltimore Gas & Electric Co., Baltimore, Md.

**CURRENT TRANSFORMERS** from 200 to 4000 amperes, 600 volts and below for indoor or outdoor use


TYPE BKM
for 1200 and 1500-ampere use has an opening 4¼" high, 1¾" wide for the primary conductor.
TYPE TWM
is available in 200, 400, 600 and 800 amperes, with intermediate ratings obtainable by passing the primary conductor through the 1⅜"x 2¾" opening more than once.
TYPE BKM
for 2000, 3000 and 4000-ampere application has large 4¼" square opening for primary conductor

## Completely Molded in Thermo-setting Resin

# No Maintenance

**Maintenance is eliminated** on all Allis-Chalmers service-proved molded current transformers. They are molded in a thermo-setting resin with an inherent toughness which assures long life and resistance to all kinds of weather. The molded resin serves as insulation, support and casing for the transformer.

Only secondary terminal inserts and base mounting inserts protrude from the molded body. A perfect seal is established because of the excellent adhering qualities of the resin.

### Tests Prove Fire Safety

Allis-Chalmers molded current transformers will never be a fire hazard. Tests prove they will not support combustion or add to a fire's intensity — an important thing to look for in a current transformer.

### Designed for Versatile Installation

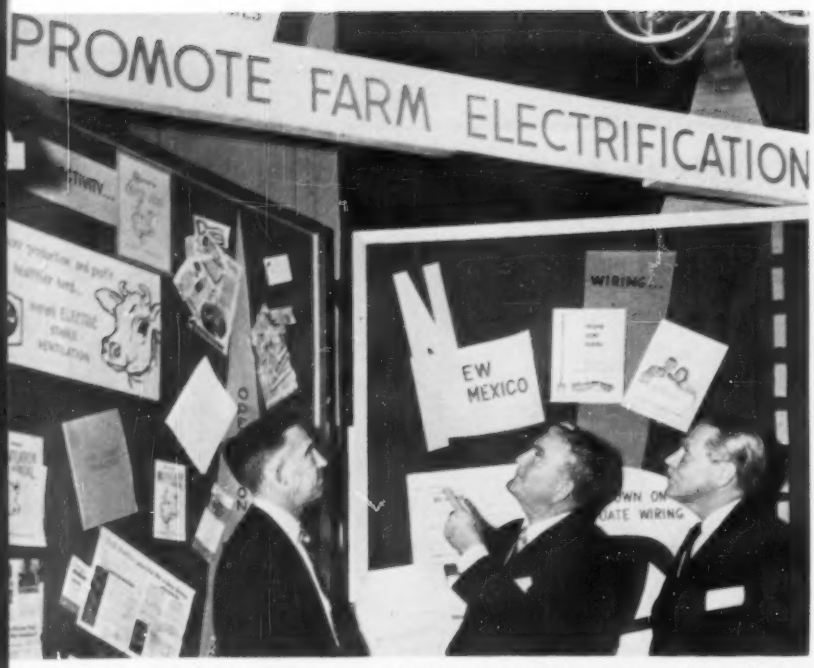
You can mount these transformers in any position. Bases of all nuts can be removed to mount on any convenient flat surfaces — bars, channels, walls, etc., with ⅜" bolts. Bases of Type TWM units can be rotated.

A removable short-circuiting device and sealable secondary terminal cover are standard on all units. A conduit box can be substituted for the secondary terminal cover. For all units 1500 amperes and below there is available a "Do-It-Yourself" conversion kit to change over to a 5000-volt bar-type unit.

**Get complete information.** See your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin. A-4874

A-C ALLIS-CHALMERS

# ALLIS-CHALMERS




**CO-OP MANAGERS Harry Oswald and B. T. Craddock inspect workshop displays with Utility Executive Merrill Skinner. Men headed water, sales, and wiring panels**

## Companies, Co-ops Pool Sales Efforts

(*Continued from page* 57)

20-year sales estimate. During the next five years farm purchases of electric devices are expected to amount to about $5.3 billion and during the next 10 years to about $11.3 billion (EW, Dec. 5, p 7). This would be an average expenditure per farm of about $1,100 for the 1956-1960 period and $1,300 for 1961-1965 period. By 1975 the spending will have reached an average of $5,300 per farm. Extent of purchases in each state are shown in table page 57. A detailed list of specific production equipment that farmers will buy appears in this issue's Statistical department page 145.

To help power suppliers to shape their selling plans and improve rate of return, Edwin L. Vennard, Middle West Service Co. presented a 15-year program for a hypothetical electric co-operative. Some observations:

- Lighting, two-temperature refrigerators, electric blankets, clothes dryers, electric space heating, and the heat pump all can help give a more uniform annual power use.
- Control water heating, go easy on air conditioning.
- Make rate schedules simple, salable, understandable, and promotable.

REA's stake in the Inter-Industry program was sounded by Fred H. Strong, deputy REA administrator and council chairman. "It's the welfare of the rural resident we're interested in and also the $3 billion the agency has loaned to build rural electric facilities. The repayment record of REA borrowers is excellent, and the government wants to keep it that way."

He was quick to rebuff rumors that rural co-ops are obligated to get behind the Inter-Industry program or face the possibility of getting no more REA loans.

### State Council Activities

Heart of the Inter-Industry program are the state councils. How well they are doing is shown in these figures:

- 25 councils are now completely organized and in operation.
- 5 are in the process of organizing.
- 14 are now in the planning and developing stage making a total of 44 states that will have councils. (Iowa, Delaware, Maryland, and Nevada are without.)

This was revealed at a special roundtable discussion—one of six to be held on the two days following the opening general session.

Participation in state council movements seem to vary widely. Most have power suppliers and educational institutions as members. Some have manufacturers, distributors, dealers, wiring contractors, and agricultural agencies, etc. But "weakest links" in most state setups were seen to be the manufacturers and distributors. To show them concretely that there are dollar profits on the farm, the Kansas Council this year conducted a market survey. It found $20 million worth of immediate desires to buy existing on Kansas farms. Most wanted item: Electric hay dryers.

(*Continued on page* 110)

**COMPANY REPRESENTATIVES J. C. Cahill and F. I. Fairman go over plans with Co-op Manager W. T. Crisp. They chairmanned Service, Council, and Training sessions**

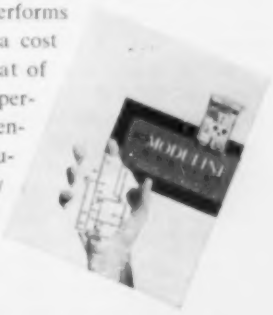
## ...AN EFFICIENT SUPERVISORY DEVICE FOR REMOTE 24-HOUR-A-DAY MONITORING ELECTRIC TRANSMISSION AND DISTRIBUTION SYSTEMS...

The Sprague Moduline Monitor is a power line carrier system designed for monitoring operation of oil circuit breakers, transformers, switches and other equipment in unattended substations on Transmission and Distribution Circuits.

The Moduline Monitor provides system operators and management with practical, flexible monitoring equipment to give instantaneous knowledge of changes in system conditions.

A single Moduline Monitor is capable of supervising up to 25 points or functions from a remote location—using only ONE carrier channel.

The Moduline Monitor performs its important functions at a cost considerably less than that of other multipoint carrier supervisory systems. A comprehensive description of the Moduline Monitor and its theory of operation is contained in Sprague Bulletin MD-7002. Send for your copy



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MONITOR

THE MODULINE DIVISION OF THE
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## Companies, Co-ops Pool Sales Efforts

(*Continued from page* 108)

Besides market surveys other states are doing these things: Pennsylvania conducted research on hay drying and ventilation. New Mexico held a statewide meeting on adequate wiring. Kentucky published a directory of farm equipment manufacturers, distributors, and dealers; set up a farm promotion calendar, and made a survey of school appliance use. New York published series of four folders on farm electrical applications and now plans farm electrification clubs on the county level. Nebraska built up its informational channels with newsletters and brochures.

Better methods of idea exchange between various councils and members were recognized by panelists as a top need. Other problems: Financing; getting wider membership; and developing more interest from manufacturers, distributors and dealers.

Other roundtable discussions follow:

### Water Systems

Water is the key to modern farming and future equipment sales, speakers agreed. John Hosford, National Association of Domestic and Farm Pump Manufacturers, pointed out that farm homes with modern plumbing use four times as many kwhr as those without. But education and promotion are needed. Best promotional points to be stressed: Health, convenience, and sanitation. Best promotional methods: Displays, demonstration, and education.

As for irrigation, panel speakers noted that it is moving rapidly into humid areas. Leo Forrest, Deaf Smith County Electric Cooperative (Texas), said small irrigation systems served from single-phase distribution lines not only were an ideal load but were in great need by farmers. Backing this up, Guy O. Woodward, Sprinkler Irrigation Association, cited a Georgia survey which showed 700,000 additional acres could be irrigated, much of it by small sprinkler and gravity systems.

Lynn Ludlow, REA, however discouraged utilities from attempting to control hours of operation of irrigation pumps. And H. S. Hinrichs, Kansas Inter-Industry Council, recommended that phase converters be used only as a last resort. If they are used, they should be made as a part of the motor. On irrigation rates, Ludlow advised that they be set up on an annual basis. He suggested utilities use a minimum bill approach rather than a hp or demand charge.

### Wiring

Some 90% of farm homes are improperly or inadequately wired, L. E. Barrett, president, National Association of Electrical Distributors, told the session on wiring. Several speakers agreed that as wiring is not always self evident, personal calls are necessary to sell farmers. An Iowa man said his company had done this successfully, using full-time men who spent 2 to 3 hr on each of some 3,000 farms.

The new "Farmstead Wiring Handbook" (EW, Oct 3, p 152) could be used most effectively if its presentation to farmers, contractors, etc, is supplemented with face-to-face discussions, said A. H. Kessler, North Central Electrical League. Other wiring sales ideas presented:

- "Farmstead Re-wiring Promotion Manual" available at $10 a copy from North Central Electrical League, 201 Foshay Tower, Minneapolis, Minn.
- Wiring demonstration trailers to travel rural areas as used in TVA area.

One serious drawback in the adequate wiring battle was spelled out by F. E. Keith, vice president, National Electrical Contractors Association. Too many contractors, he said, aren't interested in farm wiring. Reasons: Jobs are usually small and not too profitable, and there's still plenty of jobs in the city.

On the operating side, Joseph N. Crosno, Cornbelt Electric Cooperative (Ill.) stressed the growing need for heavier distribution and service entrance equipment. He advised locating transformers nearer to farmers' meters in order to cut line loss. Other wiring trends noted: Higher voltages on farms, some to 480-v; need for 200-amp service on more and more farms. There was strong suggestion that farm service entrances be subdivided as is done for large commercial and industrial customers.

### Equipment Sales

Three main problems in making farm sales were pointed up at the Equipment Sales Roundtable: (1) Too much equipment requires too much engineering to install, (2) more completely assembled units are needed, (3) initial cost.

Other points brought out:

- Power suppliers should not have to merchandise provided dealers are doing a good job.
- Dealers would find it profitable to send salesmen into rural areas on cold calls, at least part time.
- Education, direct mail, and demonstration are the best ways to reach and sell the farmer.

### Equipment Servicing

Servicing is a responsibility of all industry elements but should not be made a burden without profit. This was the consensus at the Equipment Servicing roundtable. The power supplier's greatest job would be to encourage and train dealers in proper servicing methods and policies.

Ways to better execute the service function: Keep customers informed of their service facilities before they buy, educate young people in care and maintenance, encourage customers to read instruction booklet when buying, use moble repair shops. (It was estimated one could be put on the road for $3,500.)

How much should be charged for service? Don't charge time and half or overtime or anything that will unduly penalize the customer. One company invites drive-in service. Another method is to charge $3 for 15 min. Most small service calls can be made in that time. Anything over that, charge by the hour per man.

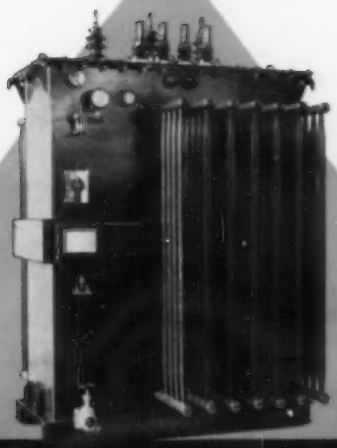
### Training

Sales people must first be trained to know what they are selling, and the power supplier should take the lead in setting up such programs, the training session was told. Start at the top with the manufacturer and distributor, get their backing, and then move in on the dealer. Homer N. Gibbs, Texas Power & Light Co, suggested utilities woo the support and active help of agricultural departments at state colleges.

## S&S SHORTS

### Quits Merchandising

Western Light & Telephone Co, Great Bend, Kan., will retire from direct merchandising of electric appliances after Jan. 1, 1956.



# UPTEGRAFF POWER TRANSFORMERS

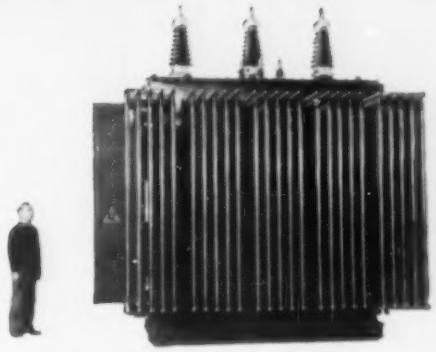
## PROMPT DELIVERY...
## FULLY GUARANTEED

A complete engineering department and a modern, fully-equipped plant give Uptegraff the facilities it takes to provide fast service on power transformer production—even those of special design.

Available in sizes up to 10,000 KVA, 115 KV, every Uptegraff transformer meets or exceeds ASA, NEMA and AIEE standards and is fully guaranteed by our company.

These two advantages are yours when you order Uptegraff transformers for your power needs. And when the unit is delivered and installed, you have one of the finest built pieces of electrical equipment in the country—rugged, leakproof, undercoated, and performance tested.

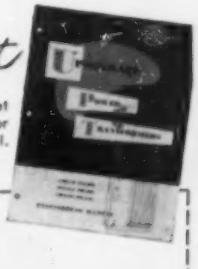
You can order Uptegraff Power Transformers with standard accessories; terminal arrangement, cooling fans, wheels, oversize bushings and many other special accessories are optional.



If you're getting ready to replace or add to your transformer installations, Uptegraff can serve you well and quickly.

*Send for Data Booklet*

Use coupon below or your letterhead and get this comprehensive ENGINEERING MANUAL for executives, engineering and operating personnel.



**R. E. Uptegraff Manufacturing Co.**
*Scottdale, Pennsylvania*

R. E. UPTEGRAFF MANUFACTURING CO.
Scottdale, Pa.

Name _____

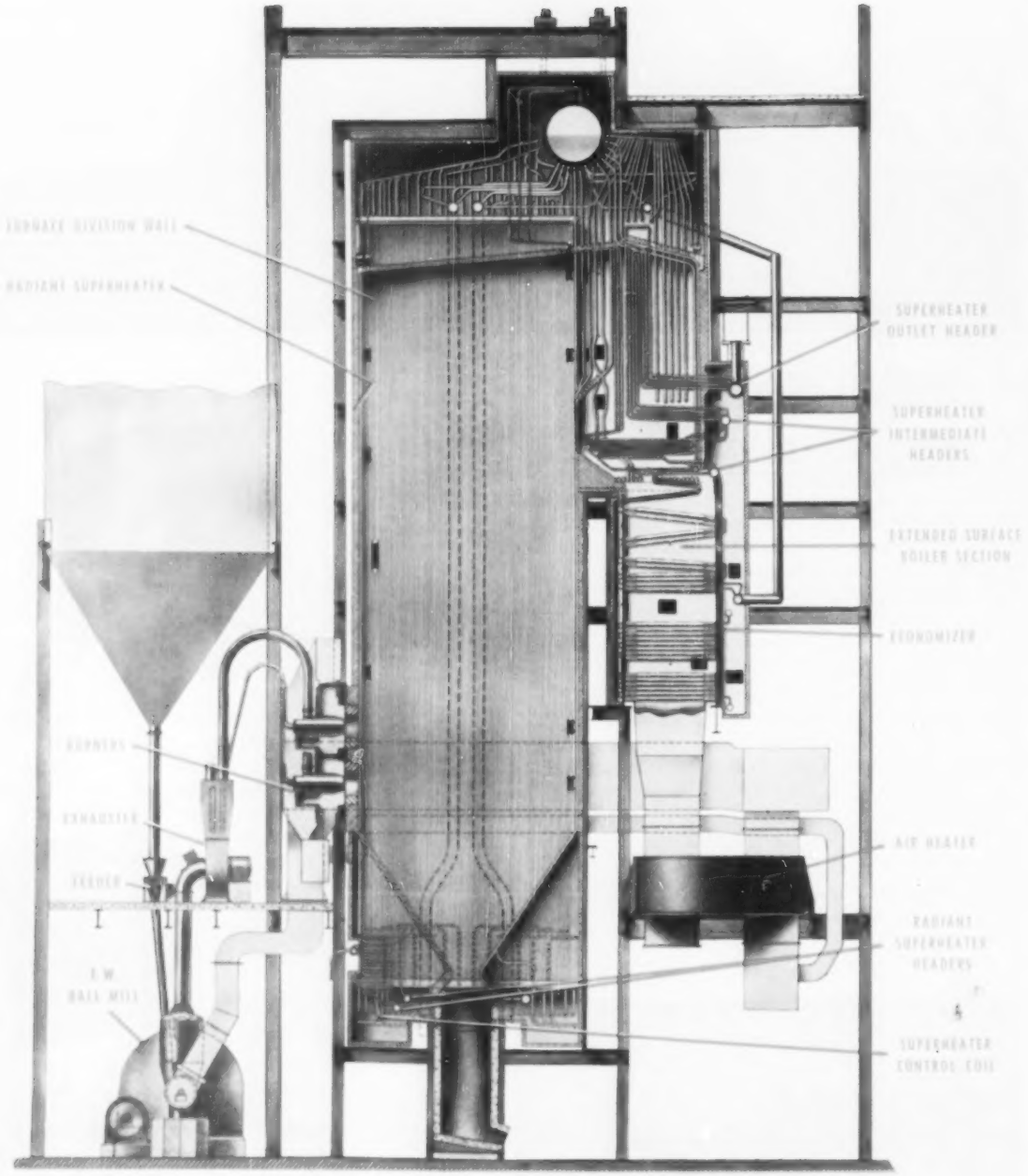
Address _____

City _____ State _____

EW

large mid-western utility

# 8th FW STEAM



# installs

# GENERATOR

*New Foster Wheeler Unit supplies 860,000 lb/hr at 1700 psig for 100,000-kw turbo-generator ... brings total capacity on this one system to 2,145,000 pounds per hour!*

Latest addition to the modern steam plant shown above is a new 100,000 kw turbo generating unit. It is served by the Foster Wheeler unit shown in section at the left, which generates 860,000 pounds of steam per hour, at 1700 psig pressure and a temperature of 1000 F.

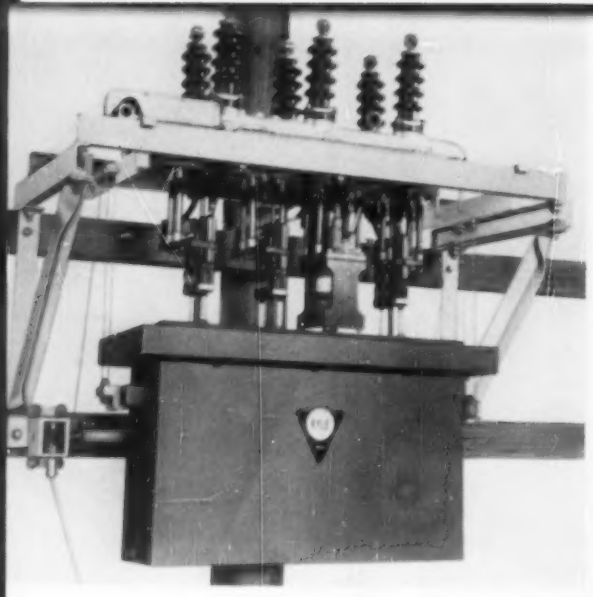
This installation marks the *eighth* large Foster Wheeler steam generator now "on line" in the various stations of this *one* utility system. Among the features of this unit are the FW combination radiant and convection superheaters, new horizontal steam separators, the reliable FW ball mill pulverizer system and the improved inter-vane burners.

Here we have positive proof of customer satisfaction — based on years of actual on-the-job performance with previously installed FW equipment. That means satisfaction that covers every phase of the job, from planning and erection to successful operation and servicing.

Repeat orders like this, from leading utilities throughout the country, are your best assurance of trouble-free steam generator performance. Whatever your pressure, capacity or steam purity requirements, you can meet them *with confidence* by specifying Foster Wheeler equipment. *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

**FOSTER WHEELER**

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.



# NEW EQUIPMENT

## Recloser Tank Hoist

This tank hoist is designed to facilitate periodic inspection of pole-mounted Kyle Type R reclosers. The hoist assembly consists of a crank handle, worm-drive windlass, and non-corrosive steel cables.

The new device lowers the oil-filled recloser tank to expose the recloser mechanism for inspection. The hoist can be left in place at the recloser installation or readily moved to other locations.

The tank hoist can be ordered for reclosers in service or with new units from the factory.

**Line Material Co, Milwaukee 1, Wis.**

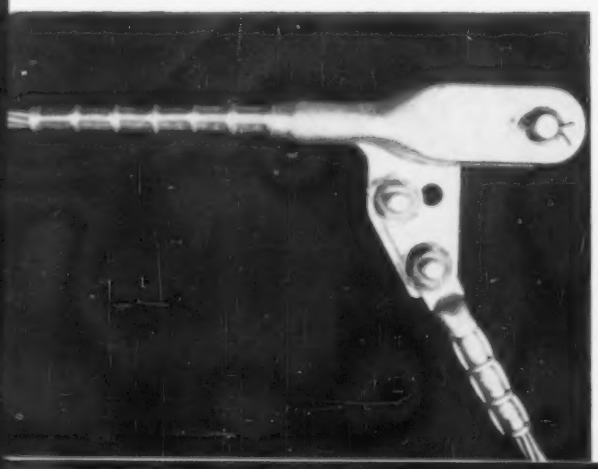
## 50-Kvar Power Capacitor

This 50-kvar power capacitor for voltages from 2,400 to 7,960 v is designed to permit utilities to place more capacity on limited pole space. The manufacturer reports that the new capacitor has a lower installation cost per kvar and provides more kvar capacity per pound.

The capacitors can be installed in the one and two-unit racks presently used for 25-kvar units. The three and four-unit racks now in use will take three of the new 50-kvar units.

Solder-sealed bushing and zinc-spray finish used on previous capacitors are retained on the new unit. Mounting lugs are equipped with lifting eyes to facilitate handling by hook or sling.

**Westinghouse Electric Corp, P. O. Box 2099, Pittsburgh 30, Pa.**



## Deadend Connector

This compression deadend connector, designed for ACSR conductors from 1/0 through 336.4 Mcm, is said to develop holding strength greater than the minimum rated strength of the conductor accommodated.

A cast EC aluminum body and headed steel splice are basic components of the deadend (Catalog No. YDW-R). The body is steel reinforced at clevis holes and at surface of the inner recess where the headed steel compression sleeve bears. Raised guide rings indicate correct number and location of crimps on the deadend body.

**Burndy Engineering Co, Inc, Norwalk, Conn.**

## BUMBLE BEES CAN'T FLY

Physicists and Aerodynamic Engineers have been mystified for years by the flight characteristics of the common bumble-bee. According to their calculations, the bee should never be able to leave the ground. His mass, his wing-spread and his muscular development all added together in a mathematical manner positively prove that he can't take off. Nevertheless, there he is, in the air, buzzing merrily about with a heavy pay-load of honey.

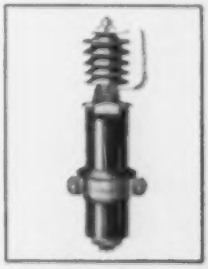
So it is evident that some mathematicians must be wrong. They are like the man who stood looking at the giraffe while saying, "There is no such animal." The same is true of some manufacturers, especially in the lightning arrester field. You have doubtless heard much theory, sincerely propounded, some mathematics and considerable test data, all designed to prove that expulsion type lightning arresters are impractical, won't work and are unsafe. *Some* expulsion designs have failed. *Many* valve types have failed.

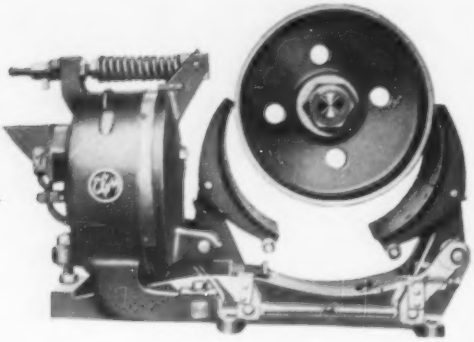
Some designers are smarter, or luckier, or better mathematicians than others and their products succeed where others do not. Call it what you will, over a million Autogaps are on the lines, out-performing, out-testing and out-protecting every other design in existence, and have been doing so for 15 years. Autogaps are the only arresters carrying a 5-year warranty.

Can we believe what we can see or must we still say that, "Bumble Bees Can't Fly!"

**HUBBARD** AND COMPANY

Pittsburgh 1, Pa.
Chicago 50, Ill.
Oakland 8, Cal.





## DC Motor Brake

This brake is built to AISE and NEMA standards and is designed for dc motor applications such as overhead crane trolley drives and mill drives. It is available in 8, 10, 13, 16, 19 and 23-in. wheel diameter sizes.

The spring-set and magnetically released brake (Type WB) features lubrication of all bearings, and adjustment for braking torque and armature air gap. The mechanism has no parts passing over the top of the brake wheel.

**Electric Controller & Mfg Co, 4500 Lee Rd, Cleveland.**

## Induction Heater Line with Sixteen Models

A line of electronic-type induction heaters features 16 models in four output ratings for brazing, soldering, surface hardening and annealing. The line is rated 7.5, 15, 25 and 40 kv.

Each model has combinations of thyatron power control, built-in output transformer, or tapped-tank coil. Dustproof cabinets and aluminum enclosures for oscillator units are included.

Voltage regulation maintains tube filaments within ±3% of rated value. Instruments measure plate and grid current, filament voltage, hours use.

Protective devices are: Overload relay in plate supply, fused control circuit, time-delay relay for tube warm-up, water-flow and over-temperature interlocks, and interlocked access doors.

**General Electric Co, Schenectady 5, N. Y.**

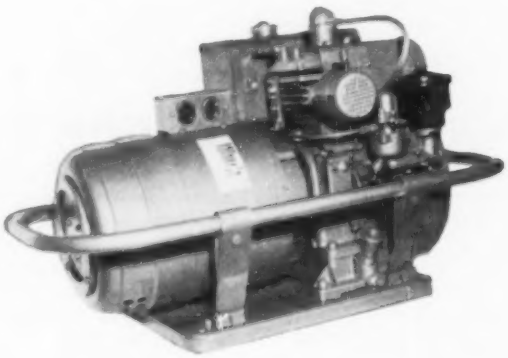
## Portable Power Plant

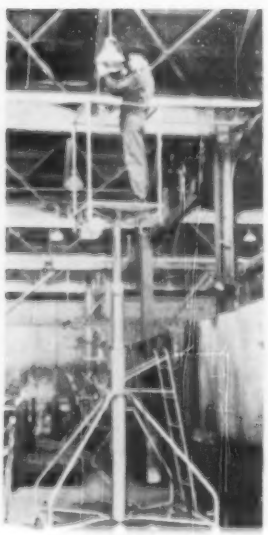
This portable ac power plant is available in 1.0, 1.5, 2.5 and 3.5-kw sizes for emergency utility use.

The line has four-cycle engines with manual starting. Equipment includes carrying handles and optional two-wheel dollies.

Weights range from 90 lb on the 1.0-kw model to 280 lb on the 3.5-kw unit. The 2.5 and 3.5-kw units are dual 110/220 v, adaptable to single-phase uses.

**Katolight Corp, Box 891, Mankato, Minn.**





## Elevating Work Tower

Hydro-electric elevating work tower for one-man is powered by a ¾-hp single-phase motor. The ML-4-AC Moto-Lift, as it is called, operates on 110 v ac.

The platform can raise 400 lb from 7 ft above the floor to 17 ft in 25 sec. The all-steel tower, equipped with swiveling casters, 5-in. rubber tires and safety brakes, has a 61 by 61-in. base and 30 by 30-in. work platform. Guard rails slide down in their sockets, and the base folds to 30 by 80 in.

Manufacturer reports the elevating work tower meets specifications of National Safety Code.

**Safway Steel Products, Inc, 6234 W. State St, Milwaukee 13, Wis.**

*(More New Equipment on page 118)*

# Use Simplex Control Cables

## WITH PRINTED COLOR CODING

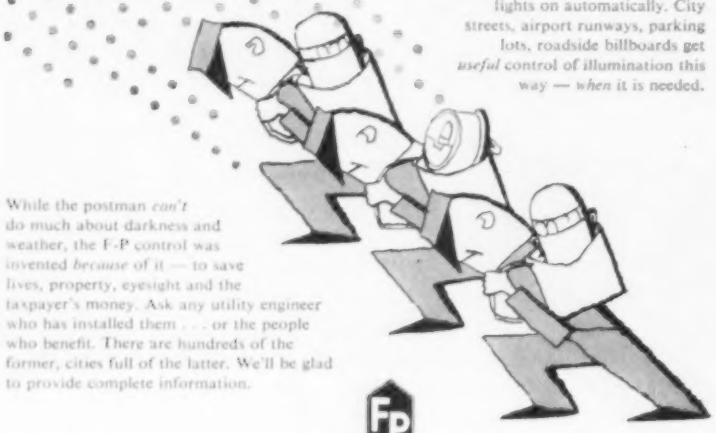
- Clear, white identification on a solid black background stands out every 2½ inches on two sides of each conductor in Simplex Control Cables.
- At a glance, printed color coding tells you what you want to know.
- When examining control cable conductors with colored rubber coverings in poor light, or after handling has discolored them, you know how hard it is to pick out the conductors with which you want to work.
- Printed color coding provides instant, definite identification.
- "Individual conductors made with rubber insulation and thin neoprene jacket or they may be made with polyvinyl-chloride insulation and jacket. Find out more about printed color coding and the complete line of dependable Simplex Control Cables by writing to the address below."

**Simplex CONTROL CABLES**
*with* **PRINTED** COLOR CODING

**SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Massachusetts**

*neither snow nor rain, nor heat nor gloom of night...*

... can keep the dependable postman — or a Fisher-Pierce photoelectric lighting control — from "completing the rounds." Whether it gets dark at 3 o'clock in the afternoon or 8 at night . . . in any season and in any weather (as long as there's power) — F-P controls switch lights on automatically. City streets, airport runways, parking lots, roadside billboards get *useful* control of illumination this way — *when* it is needed.



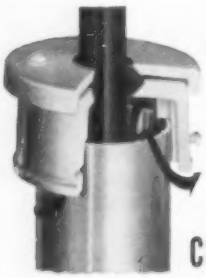
While the postman *can't* do much about darkness and weather, the F-P control was invented *because* of it — to save lives, property, eyesight and the taxpayer's money. Ask any utility engineer who has installed them . . . or the people who benefit. There are hundreds of the former, cities full of the latter. We'll be glad to provide complete information.

FP

THE FISHER-PIERCE COMPANY, INC.
82 Pearl Street, So. Braintree, Boston 85, Mass.

EXPORT:
Philips Export Corp., 100 E. 42nd Street, New York 17, N. Y.
In Canada:
Northern Electric Co., Ltd.





Cool way to add cable life

CONDUIT VENTILATING CABLE SUPPORTS FROM PLM

PLM Type CV Ventilating Cable Support for use at top of conduit where cable extends into air.

PLM Type BCV Ventilator for use at bottom of conduit.

● Cable risers in non-ventilated conduit often build up temperatures which can shorten service life. PLM Ventilating Cable Supports provide support for risers in conduit, but permit escape of heated air ...materially reduce temperatures...increase service life...provide increased load-carrying capacity.

Types for base and top of new or existing installations, with or without flanges for supporting potheads. Write for catalog and prices.

PLM Products, Inc.
3873 West 150th St. • Cleveland 11, Ohio

WIRE AND CABLE FITTINGS AND ACCESSORIES
Armored Cable Terminators • Splicing and Terminating Kits • Conduit Ventilators


## Water Level Gauge

A new bi-color water level gauge is recommended for pressures up to 900 psi on existing or new boilers. Readability is simplified because water-filled ports show green and steam-filled ports red. Vision length is 12 in.

The gasket elements, glass, and small mica can be replaced without removing gauge from the boiler. The unit is also reported to have greater pressure and thermal stability because of design principle using small round ports. Long warming period is not required.

The water level gauge, Model MP-900, has either end stems or flanged connections.

**Diamond Power Specialty Corp, Lancaster, Ohio.**

## MORE NEW PRODUCTS

Marlin Mfg Corp, 12410 Triskett Road, Cleveland 11, Ohio, offers standard **interchangeable parts for thermocouple connectors.** Components or complete assemblies are available.

Ideal Industries, Inc, 1021 Park Ave, Sycamore, Ill., has **wire guides** in ½, ¾, 1 and 1¼-in. sizes for sliding conductors into conduit.

Milli-Switch Corp, 1742 Berkeley St, Santa Monica, Calif., has a **subminiature toggle switch** that is ¾ in. long, ⅞ in. thick and mounts in a ¼-in. hole. Available in spdt, dpdt and tpdt, model B-T1-1 is rated 5 amp at 125/250 v ac; 3 amp at 30 v dc, inductive; 4 amp at 30 v dc, resistive.

Ripley Co, Middletown, Conn., has a **sub-miniature blower** (L-R No. 1) that will move 8 cfm at 1-in. static pressure when running at 20,000 rpm. It weighs less than 2¾ oz and uses a 1-in. diam impeller.

Pyle-National Co, 1334 N. Kostner, Chicago, Ill., has explosion-proof **instrument enclosures** that have threaded covers and heavy round glass windows.

Huenefeld Co, 2702 Spring Grove Ave, Cincinnati 25, Ohio, has flanged and flangeless wireway, and accessory fittings and components for assembling complete **electrical wireway systems.**

(Continued on page 120)

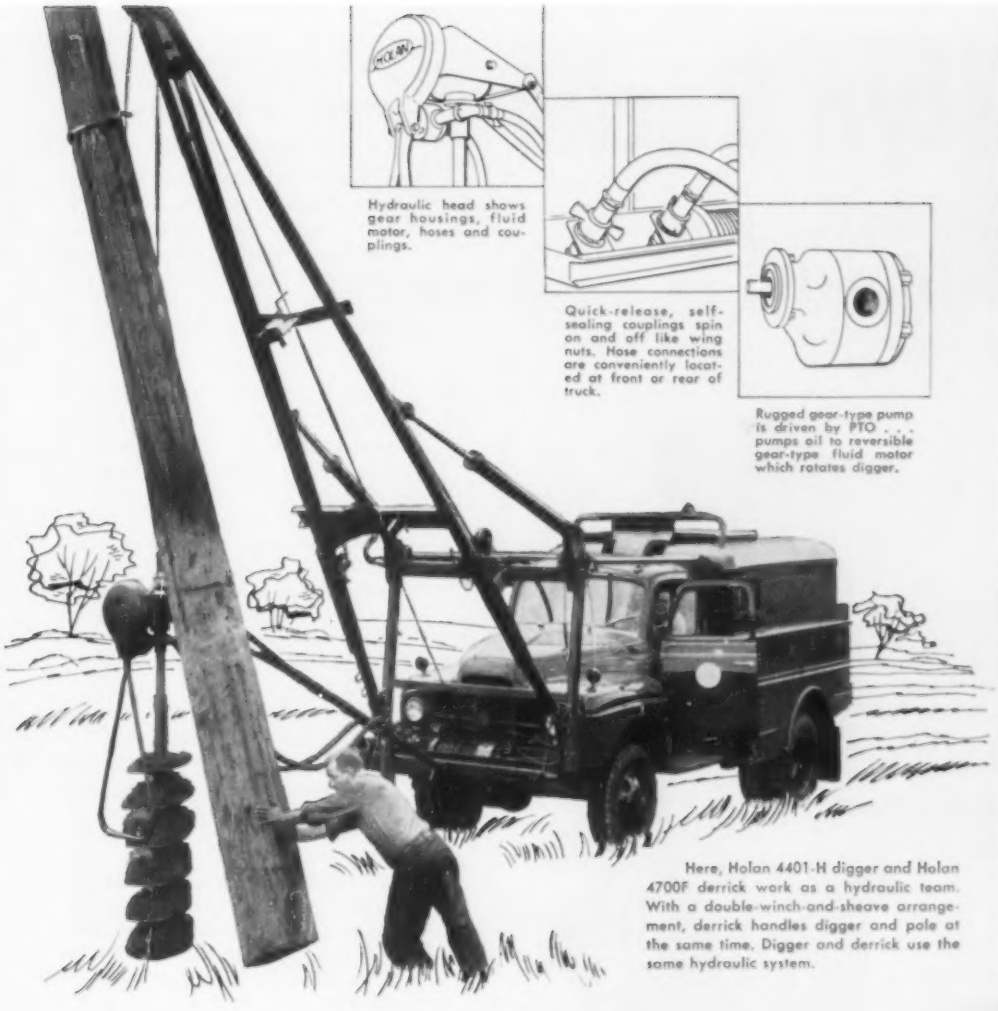
Hydraulic head shows gear housings, fluid motor, hoses and couplings.



Quick-release, self-sealing couplings spin on and off like wing nuts. Hose connections are conveniently located at front or rear of truck.



Rugged gear-type pump is driven by PTO . . . pumps oil to reversible gear-type fluid motor which rotates digger.



Here, Holan 4401-H digger and Holan 4700F derrick work as a hydraulic team. With a double-winch-and-sheave arrangement, derrick handles digger and pole at the same time. Digger and derrick use the same hydraulic system.

# HYDRAULIC POWER MAKES BORING JOBS PLEASANT

Holan's new hydraulic digger is smooth going down. In fact, the 4401-H digs holes so easily that you appreciate most what it doesn't do. It doesn't vibrate and tire the workmen. It doesn't create mechanical stresses when stalled. And it doesn't require a lot of maintenance — there are no bearings, no universal joint, no shear pin, no complicated mechanical linkages. Putting it positively, the 4401-H makes hole-digging anywhere easier than ever before.

The Holan 4401-H Hydraulic Earth Borer digs holes from 8 to 20 inches in diameter and up to eight feet deep. Write for the new catalog.

J.H. HOLAN CORPORATION

4100 WEST 150TH STREET
CLEVELAND 11, OHIO

OTHER PLANTS:
HOLAN Thrift Line CORP., Griffin, Georgia • J. H. HOLAN CORP., Phoenix Div., Arizona
BRANTFORD-HOLAN LIMITED, Brantford, Ontario


THE NAME THAT MEANS WORK SIMPLIFICATION

Line construction bodies for light to heavy-duty. Crew compartments optional. Efficient tool compartments and drawers.

Service bodies for chassis up to 1½ ton. Lengths, 72", 75", 84", 90", and 102".

Hydraulic derricks designed for rear mounting. Capacities to 12,000 lbs. Also, light-duty, power-operated derricks.

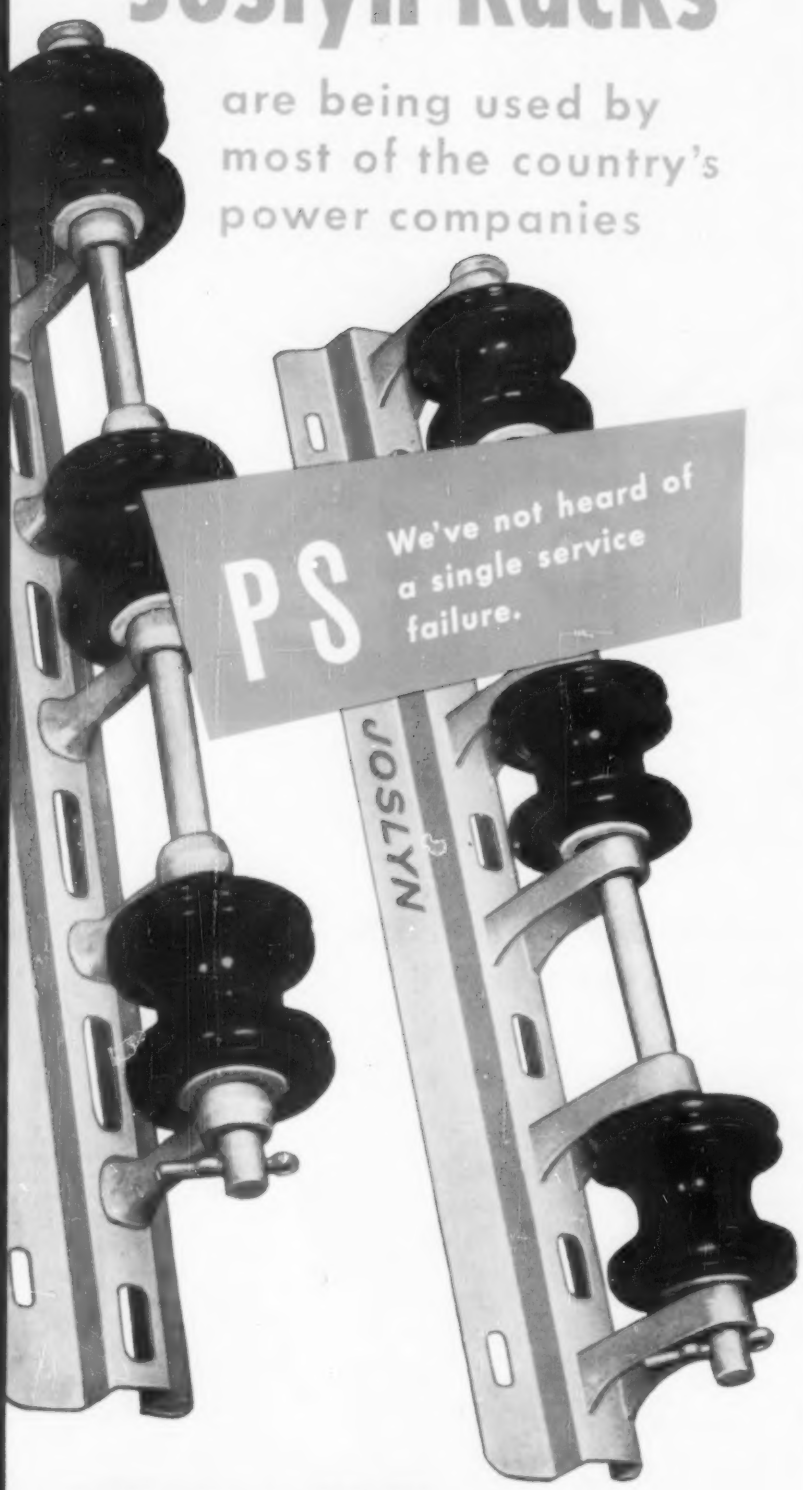
Ladders to 40' with all phases completely hydraulic. Pump actuated by P.T.O. or separate engine drive with electric starter. Also, expertly-engineered mechanical ladders to 32'.

Portable mechanical and hydraulic earth borers with optional rotation.

Hydraulic towers from 17' to 30' with rotary, stationary, or transverse platforms. Exclusive box-girder telescoping mast.

# Joslyn Racks

are being used by most of the country's power companies




JOSLYN

Executive Offices
155 N. Wacker Dr.
Chicago 6, Illinois


## More New Products

(*Continued from page* 118)

Radio Corp of America, 30 Rockefeller Plaza, New York 20, N. Y., has a **mobile radio microphone** for operation over 200-3,000 cycle range. The plastic unit, offered with a 5-year guarantee against case breakage, weighs 14 oz with cable. It is 6½ x 2$\frac{13}{32}$ x 1$\frac{13}{16}$ in.

Keystone Mfg Co, 23328 Sherwood Road, Center Line, Mich., offers **custom boxes and cabinets** in every type, size or gauge of steel required.

Edwin L. Wiegand Co, 7500 Thomas Blvd, Pittsburgh 8, Pa., has added secondary insulation to its all-metal infrared electric **radiant heater** to permit its use in series on circuit voltages up to 600 volts. It is available in ratings from 375 to 1,200 w.

Stone Machinery Co, Manlius, N. Y., offers the following:

**Traverse saw** with 14-in. wheel diam cuts stone, concrete, etc, 5 in. deep and 9 ft long. The unit weighs 83 lb and has a 115-v, ac-dc motor of 25-60 cycle, 15-amp rating.

**Double cutting machine** (DM-352) cuts non-ferrous metals with saw blades and ferrous metals with abrasive cut-off wheels. Blades of 12 or 14 in. are used for either 45 or 90 deg cuts.

American Blower Corp, Detroit 32, Mich., offers a line of **industrial fans** (Series 106) in sizes 11 through 37 with adjustable discharge for volumes to 47,000 cfm. Fixed discharge units in sizes 41 through 60 can handle up to 125,000 cfm.

Minneapolis-Honeywell Regulator Co, Micro Switch Division, Freeport, Ill., has developed an electric two-hand **clutch control** for industrial machines. The unit incorporates several new safety features.

General Cable Corp, 420 Lexington Ave, New York 17, N. Y., has **service entrance cable** rated 100 amp, 75 C, wet or dry, either 3 conductors of No. 3 wire, or 2 of No. 3 and 1 of No. 5 wire.

Martindale Electric Co, 1371 Hird Ave, Cleveland 7, Ohio, has developed a shop-type **mica undercutter** for use on all armature sizes.

# ALL WRAPPED UP IN OUR WORK!

We're all wrapped up in our work . . . making better cable tapes and electrical insulating materials.

Chase cable tapes are made in a very wide range of materials to meet every requirement of the industry. Binding, insulating, ozone resistance . . . or whatever the requirements . . . Chase has tapes to fit the job.

All Chase electrical insulating products are made to the highest specifications of the best materials available. They are engineered to meet your electrical requirements by men who are specialists in their business.

Attach the check list to your letterhead for more information on specific types of tape. Chase & Sons, Inc., Randolph, Massachusetts.

CLIP TO YOUR LETTERHEAD AND MAIL TODAY!

*Please send Chase Electrical Insulation File. I am especially interested in:*

- ☐ Insulating Tape
- ☐ Binder Tape
- ☐ Jacket Tape
- ☐ Moisture Seal Tape
- ☐ Neoprene Tape
- ☐ Flame Retardant Binder
- ☐ Conductivity
- ☐ Ozone Resistance

# CHASE

**ELECTRICAL INSULATING TAPES AND MATERIALS**

- Reaches hard to get at spots
- Bores holes up to 10 feet deep from any truck position
- Low cost—easy to use—easy to transport
- Industry tested and accepted

DIG HOLES—SET POLES WITH YOUR LINE TRUCK AND

**TEL-E-LECT'S POLE HOLE DIGGER**

When your derrick truck is equipped with a Tel-E-Lect Digger, your crew can dig a hole and set a pole in less than five minutes! This rugged auger, suspended from a front or rear mounted derrick, is raised or lowered by the winch line. Auger rotation power is supplied through a telescoping drive shaft connected to the PTO.

This efficient digger reaches up on a hill, down into ditches, or across obstacles . . . anywhere up to 20 feet behind the truck. The interchangeable hardened steel augers, 8" to 20" in diameter, are built to operate under the most rugged soil conditions.

**Tel·E·Lect PRODUCTS, INC.**

10,003 Minnetonka Boulevard — Minneapolis 16, Minnesota

get your man!

ELECTRICAL WORLD's audience is everyone concerned with generation, transmission, distribution and utilization of electricity in large amounts—25,000 *all-paid* subscribers! In utilities and big industry, among electrical manufacturers and consultants . . . only World covers the entire Electric Power Industry. Like to know more, in easy dosage? Write for "Quick Facts" . . . Electrical World, 330 West 42nd St., New York 36, N. Y.


## CATALOGS—BULLETINS

**• MOBILE POWER SUPPLY:** A new mobile ac power unit is described in an 8-page brochure titled "Now . . . AC Power Goes Anywhere a Vehicle Can Go." Booklet includes technical and application data on the unit which is said to supply up to 10 kw at standard voltages and frequency. Miehle Printing Press & Mfg Co, Star-Kimble Motor Division, 200 Bloomfield Ave, Bloomfield, N. J.

**• GAS-FILLED CABLES:** Bulletin 1095 covers applications and general design of gas-filled cables. The 16-page illustrated booklet includes operating advantages and characteristics, splicing and terminating drawings, and accessories. Okonite Co, Passaic, N. J.

**• ELECTRO-PNEUMATIC CONTROLLERS:** Specifications and temperature ranges are included with description, drawings and photographs of a line of electro-pneumatic controllers in 4-page Data Sheet ND46-33(106). Leeds & Northrup Co, 4934 Stenton Ave, Philadelphia 44, Pa.

**• TEMPERATURE CONTROLS:** A line of differential expansion temperature controls is described in Catalog G-20 (4 pages). Included are pictures, descriptions, general specifications of the line, and an instrument selection chart. Burling Instrument Co, 16 River Road, Chatham, N. J.

**• OSCILLOGRAPHIC RECORDING SYSTEMS:** Bulletin 1 (16 pages) covers a line of oscillographic recording systems, components and associated equipment. Sanborn Co, Industrial Division, 195 Massachusetts Ave, Cambridge 39, Mass.

**• NYLON MAINTENANCE:** Electrical, mechanical and chemical applications of nylon as a maintenance material are described in a 6-page folder. Specific uses are listed, and a range of shapes and sizes is included. Polymer Corp of Pennsylvania, Reading, Pa.

**• PLASTIC CONDUIT:** Advantages of Tenite butyrate plastic pipe as conduit for power lines and typical demonstrations of its use are covered in a 12-page booklet titled "Economical Cable Conduit." Pipe installations showing the manner of laying, ease of joining, flexibility, corrosion resistance and adaptability are pictured. Eastman Chemical Products, Inc, Kingsport, Tenn.

**• WATER-TREATING CONTROLS:** Cubicle instrumentation for water-treating equipment and other process applications is covered in 8-page Bulletin No. 4178, along with photos of conventional and graphic type cubicles and a number of installations. Permutit Co, 330 W. 42nd St, New York 36, N. Y.

**• WIREBOUND BOXES:** A 12-page brochure features wirebound box designs developed for manufacturers. Detailed descriptions of packaging high-voltage disconnect switches and other electrical equipment are included. General Box Co, 1825 Miner St, Des Plaines, Ill.

**• GENERAL PURPOSE TRUCK BODIES:** Dimensional data, and standard and optional features of a line of truck bodies for utility purposes are contained in 4-page catalog. J. H. Holan Corp, 4100 W. 150th St, Cleveland 11, Ohio.

• **MERCURY VAPOR LAMPS:** Two booklets on mercury vapor lamps are available from Sylvania Electric Products, Inc, 1740 Broadway, New York 19, N. Y.:

"Mercury Vapor—Today's Most Effective Street Lighting Source" lists advantages, applications, technical data and operating characteristics.

"More Light for Less Money" describes industrial applications of mercury vapor lamps. Specifications and applications of 16 lamps are included.

• **ELECTRICAL PRODUCTS:** A 52-page handbook features eleven lines of industrial products including electrical products, insulations, and refractory products. Descriptions, engineering data and related information are included in "Products Handbook." Johns-Manville, 22 E. 40th St, New York 16, N. Y.

• **MAGNETIC DRIVE:** Use of a magnetic drive which provides adjustable speed power for fan-type and constant-torque loads is covered in 4-page folder, No. 1409-PRD-229. Construction, ratings, speed ranges, dimensions and other data are included. Electric Machinery Mfg Co, Minneapolis 13, Minn.

• **ELECTRIC CLUTCH CONTROLS:** Electric two-hand clutch controls for industrial machines are covered in 12-page Catalog 65. Productivity, safety and versatility of the line are described. Minneapolis-Honeywell Regulator Co, Micro Switch Division, Freeport, Ill.

• **DEHUMIDIFIERS:** Sprayed coil dehumidifiers for central station use are described in 20-page illustrated Bulletin 7827. Application data, design and construction features, and installation drawings are included. American Blower Corp, Detroit 32, Mich.

• **THERMISTORS:** Historical background, operating characteristics, applications, and engineering data on a line of thermistors are covered in 36-page Data Book. Victory Engineering Corp, Union, N. J.

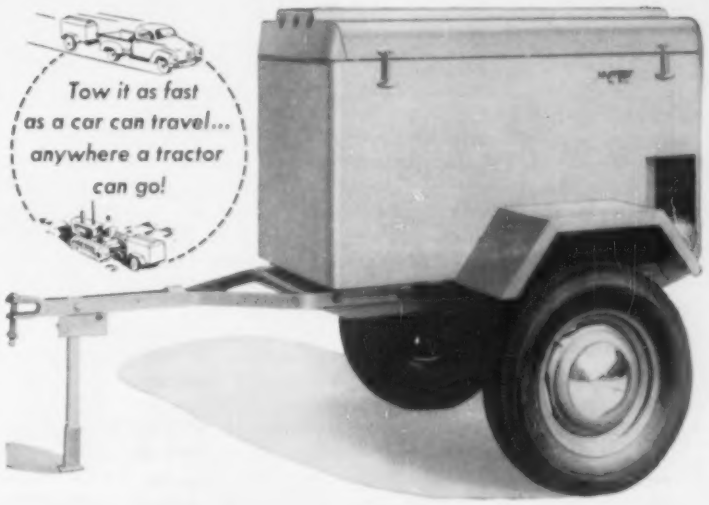
• **ORGANO-SILICONE COMPOUNDS:** Six new organo-silicone compounds with unusual lubricating and solubility properties are described in an 8-page data sheet, Form 8931. Linde Air Products Co, a division of Union Carbide & Carbon Corp, 30 E. 42nd St, New York 17, N. Y.

• **POLYETHYLENES:** Nomenclature changes for a line of vinyl and polyethylene resins and compounds are covered in Kabelitems, No. 85. New and old designations and compound descriptions are listed. Bakelite Co, a division of Union Carbide & Carbon Corp, 260 Madison Ave, New York 16, N. Y.

• **CONNECTORS:** A line of compression connections for distribution lines is the subject of 18-page Catalog Section 13-A. Descriptions, specifications, and installation of service entrance sleeves, adapters, ground rod fittings, line taps, copper and aluminum connectors, and other equipment are included. James R. Kearney Corp, 4236 Clayton Ave, St. Louis 10, Mo.

• **TRIPLEX SERVICE DROPS:** Types and sizes of aluminum triplex service drops are illustrated and described in a 20-page booklet. Kaiser Aluminum & Chemical Corp, Industrial Service Division-PR255, 1924 Broadway, Oakland, Calif.


# Keep customers happy when power's off!




## with this NEW mobile 5 or 10KW ONAN Electric Plant!

Servicing sometimes requires that highline power be temporarily interrupted. Or storms, floods or fires may cut power to a farm, home, business or industry and cause serious losses.

The Onan trailer-mounted "CW" electric plant is made to order for situations like these. It can be rushed to the spot, hooked up, and within a very short time your customer is operating normally.

Onan "CW" Electric Plants are unusually compact, quiet-running and economical to operate; weigh only half as much as water-cooled plants of the same capacity. Powered by Onan two-cylinder, suction-air-cooled gasoline engines built with massive, long-wearing parts for continuous, heavy-duty service. Fully protected by heavy-gauge steel housing; stays on the job in any weather.

**Wide range of accessories make the "CW" more versatile**

You can equip your "CW" Electric Plants for any type of portable service. Accessories include skid, battery rack, 9-gallon fuel tank, weather-proof housing, two-wheel trailer, or 4-wheel rubber-tired dolly. Keep one or more of these portable, high-capacity units on hand for emergency or auxiliary use!

*Onan builds electric plants for every need—500 to 50,000 watts*

*Write for folder A-362*

Onan ELECTRIC PLANTS

**D. W. ONAN & SONS INC.**

2849 University Ave. S. E. • Minneapolis 14, Minnesota

# Aluminum Output Sets Another Record

A production record has been established by the U. S. aluminum industry for the fourth year in succession, reports Donald M. White, secretary of the Aluminum Association, New York, in a year-end statement. Primary aluminum production during 1955 will exceed 3-billion lb for the first time, and it is expected to be about 7% over the 1954 total, according to industry estimates.

Among the numerous 1955 developments in the production and application of aluminum are the following significant facts of interest to the electrical industry.

### 1955 Shipments Up

Shipments of semifabricated aluminum products by members of the association show large increases in 1955 over the preceding year. This is based on statistics for the first three-quarters showing, for example, shipments of sheet and plate up 39%, foil 41%, bar and rod 25%, and electric conductor up 5%, noted White.

Despite record production, the metal was in tight supply during the year as a result of the continued rise in demand. The situation was partly relieved by the government's action in diverting to industry substantial amounts of metal from stockpiling calls.

### Price Increased Twice

Two price increases became necessary in 1955 to meet wage increases, advances in raw material costs, and rising cost of new plant construction. These brought the base price of primary aluminum pig up 2¢ to 22.5¢, stated White.

One new primary producer began operations during 1955, bringing the number of producers in this country to four. Several other companies are planning to enter the primary aluminum industry. The new plants planned by these companies and existing producers would add more than a billion pounds to the nation's annual aluminum capacity.

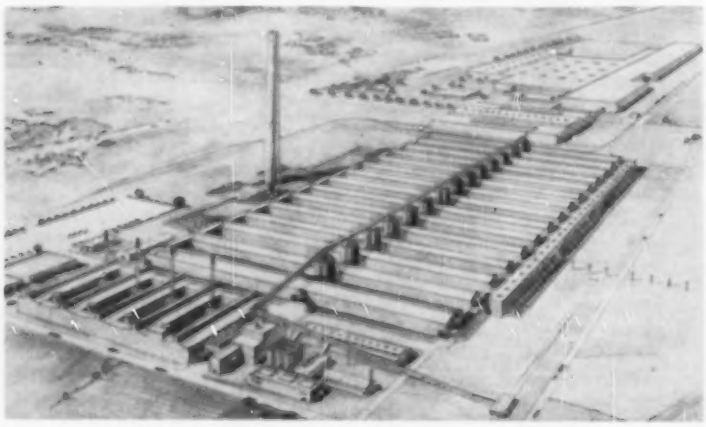
Increasing demand for aluminum products has stimulated a substantial expansion in fabricating-plant capacity. In addition, two companies are increasing their capacity for the production of covered aluminum wire for electric conductor purposes.

Two notable conferences were held by user groups during the year, stated Secretary White. First of these was a three-day conference on the electrical utilization of aluminum held by the American Institute of Electrical Engineers and devoted soley to uses of the lightweight metal in this field (EW, April 11, p 51). The other conference was held by the Building Research Institute on curtain walls.

### Three Important Advances

Three significant uses of aluminum are noted in White's statement. One use was the inauguration by the country's largest manufacturer of communication cable of a development program looking toward the use of aluminum wire in such cable (EW, Oct. 10, p 10). Another significant development was the successful production of oxide-insulated spiral-wound coils of aluminum sheet for transformers and other electrical devices (EW, Sept. 26, p 59).

A third outstanding application is noted. The "atoms for peace" program has drawn increasing attention to the usefulness of aluminum in nuclear reactors and associated equipment.



## Kaiser Plans Aluminum Expansion

Aluminum will be produced at this $120-million, 220,000-ton reduction plant (foreground) planned by Kaiser Aluminum & Chemical Corp at Ravenswood, W. Va. The architect's sketch also shows Kaiser's $96-million sheet and foil rolling mill (background) now under construction. Ohio Power Co will supply 450,000 kw to the Kaiser operations (EW, Dec. 12, p 88).

## Square D to Add Facility in Milwaukee Area

Square D Co reports having advance plans for a highly-mechanized mass production electronics plant contemplated for the Milwaukee area. Building and equipment will involve an investment in excess of $3 million.

Ground breaking is expected to be in early spring of 1956. This new plant of 150,000 sq ft will give Square D a total of 650,000 sq ft in Milwaukee.

(*More M & M on page* 126)

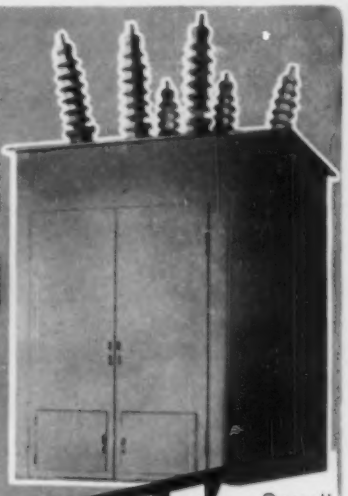
NOW!

# A 2-CYCLE DISTRIBUTION BREAKER!

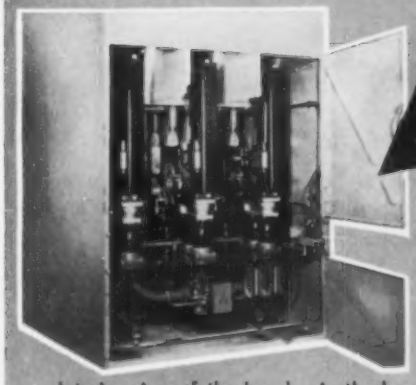
*the new*
***Ultra-High-Speed***

BROWN BOVERI **AIR BLAST BREAKERS**

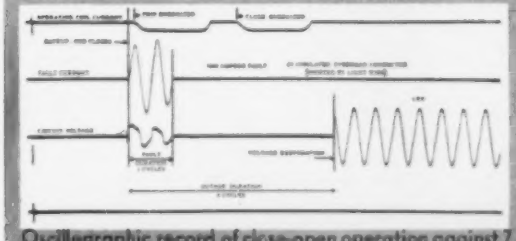
**for 5, 7.5 and 15 kV Distribution Systems**



Overall view of breaker housing. Floor space requirements are comparable to conventional breakers, terminal locations are equally convenient. 3 or 6 standard bushing type current transformers can be accommodated on underside of roof bushings. Relay panels can be placed inside the housing, accessible through separate doors without entering cubicle.



Interior view of the breaker in the housing. Note that both control mechanism and interrupters are easily accessible.



Oscillographic record of close-open operation against 7,000 amps at 5,000 volts with 7.2 kV 800 amps 150 mva Brown Boveri high speed Air Blast Breaker. The same unit was subjected to 27 consecutive close-open operations up to 10,000 amps after which, according to the testing utility, "only a small amount of burning was noticeable, and this only on surfaces that do not carry current."

HERE, at last is a super-fast breaker permitting more economical distribution system design.

The new, complete line of Brown Boveri ultra-high-speed air blast breakers in outdoor housings for 4.16, 7.2 and 13.8 or 14.4 kV (and higher if required) will handle currents up to 1,200 amps with interrupting ratings of 150, 250 and 500 mva at any of these voltages. These breakers have a *guaranteed speed of interruption* from the moment of energizing trip coils to fault interruption of NOT OVER 2 CYCLES over the full range of current from zero to full interrupting rating, and regardless of the character and power factor of the load.

These Brown Boveri Air Blast Breakers enjoy an exceptional service record because they require a minimum of maintenance and all essential components are easily accessible.

If you have been baffled by the lack of high speed breakers in your distribution system, it will pay you to investigate these 2-cycle Brown Boveri Air Blast Breakers.

*Write for Data, today!*

**BROWN BOVERI CORPORATION**

**19 RECTOR STREET, NEW YORK 6, N. Y.**

BROWN BOVERI

Atlanta, Ga. • Birmingham, Ala. • Boston, Mass. • Butte, Mont. • Chicago, Ill. • Cleveland, O. • Denver, Colo. Detroit, Mich. • High Point, N.C. • Jacksonville, Fla. • Kansas City, Mo. • Knoxville, Tenn. • Lewiston, Me. • Los Angeles, Cal. Minneapolis, Minn. • New Orleans, La. • New York, N.Y. • Portland, Ore. • San Francisco, Cal. • Seattle, Wash. • Tucson, Ariz.

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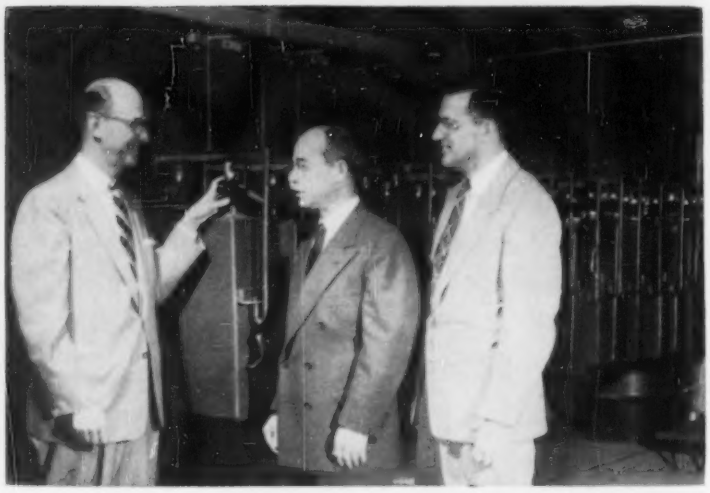


## New L-M 50-Kvar Capacitors Produced

First 50-kvar capacitors manufactured in Line Material Co's Central Plant, South Milwaukee, Wis., rolled off the production line recently. At brief ceremonies marking the occasion, Plant Manager A. E. Perlman, left, turned the first quantity over to Product Manager N. K. Delaney, center, for immediate sale and shipment to L-M customers. Viewing the transfer was B. H. Schultz, chief engineer, capacitors and regulators. Engineers under Schultz designed the new shunt capacitor units that are rated 2,400 to 7,960 v.

Delaney believes that these L-M 50-kvar units will be the first to be applied to distribution systems. The capacitors are expected to be in service early in 1956.

## El Mec Lab Announces Network Protector Testers

El Mec Laboratories, Inc, Kenilworth, N. J. has available two units for testing network protectors. Both test units are portable and designed for use in the field.

Model C-13 mechanism test set provides means for testing and adjusting the motor mechanism, desensitizing relay, and circuit breaker. Model C-15 relay test set is used for adjusting the master relay and for testing the current transformer.

## Multi-Amp Produces Induction Relay Tester

An induction disk relay test instrument is the latest addition to a line of high-current test units produced by Multi-Amp Corp, Newark, N. J.

This portable Model IDR 35/1 unit for induction disk (overcurrent) relays is reported to test with good waveform. High current is supplied by a transformer in conjunction with a reactor. Output is isolated from the supply and is controlled in stepless increments to give values up to 20 times relay current rating.

## Continental Wire Ships 2,000 Mcm VC Cable

Two reels of what is believed to be the largest single-conductor cable of its type made—wire size: 2,000,000 circular mills, about 2 in. diam—were shipped recently from Continental Wire Co, York, Pa., to a General Motors Corp plant in Michigan. Each 500-ft reel weighed over 1.5 tons.

This cable has stranded copper conductor and a 1,715-amp capacity. It is covered with multiple layers of asbestos and varnished cambric insulating tapes and an outer cover of asbestos yarn braid. By contrast, the company announces that it insulates wire drawn to 0.003 in. diam.

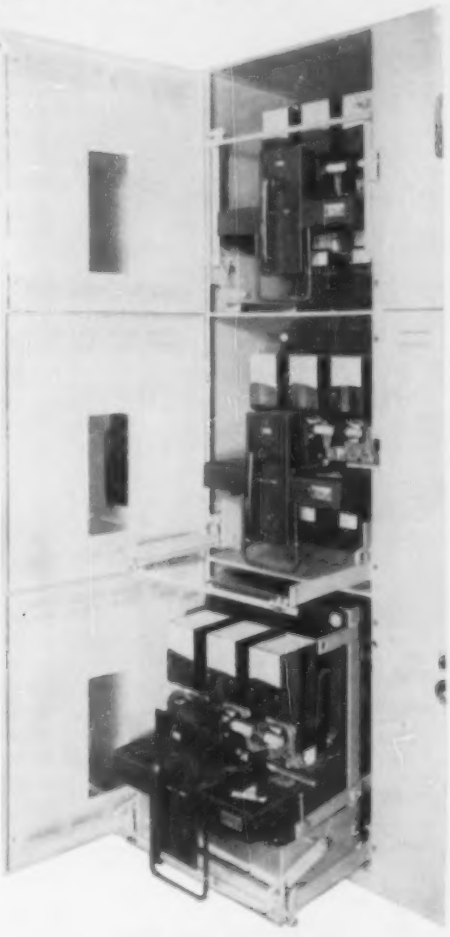
(*More M & M on page* 128)

# Outstanding Simplicity of Design in Drawout Switchgear! NOW Built to Your Exact Specifications!

This development in 600-volt drawout switchgear is important to you for these three reasons:

- It is a definite improvement on conventional design — simpler, cleaner, more quickly and easily operated, fully positive, with adequate expansion factor for future needs.
- It is the product of a highly competent engineering staff, well aware thru long experience of the requirements and responsibilities of working with utilities.
- It is our design concept adapted to your needs and exact specifications to save your money and engineering time. Design, detail, and fully satisfactory operation have been proven by extended service in the field.

For more information on this complete engineering service for utilities, please write today. Your interest is appreciated, and your inquiry will receive prompt attention.



## OPERATING CHARACTERISTICS

Single arm motion moves breaker to or from test position — no pumping, cranking, or similar operation anywhere in the cycle.

Nothing removable to get lost, no accessory or loose equipment required. Each unit is entirely self-contained.

Maximum accessibility for maintenance or adjustment. Carriage is open at top, bottom, and sides.

Lifting lugs near center of gravity minimizes rocking in lifting, facilitates hoist pick-up, fully forward of switch board in withdrawn position.

Each unit fully interlocked to prevent moving closed circuit breaker to or from operating position. Interlocks to meet your specifications.

*Other engineered products include:*

HIGH VOLTAGE SWITCHGEAR BUS RUNS CONTROL & PROTECTION FOR GENERATORS & SUBSTATIONS SPECIFICATION EQUIPMENT INDUSTRIAL CONTROLS METAL PRODUCTS SPECIAL EQUIPMENT

THE WOLFE & MANN MFG. CO

BALTIMORE 11, MARYLAND

W/M

*clear lines fast with...*

**SEYMOUR SMITH**
**"Telephone" Tree Pruner**

Here's the standard, the choice of the utility industry for years. Powerful action to cut cleanly—tough and almost unbreakable—easy to handle. No. 12 Pruner Head has 1½" cutting capacity. The lighter, No. 11, handles up to 1" branches. Both are malleable iron castings with tempered steel cutting blade.

Poles (18 ft. 3 sections) are of selected spruce with positive locking, seamless aluminum, telescoping ferrule joints.

**FAST CUTTING PRUNING SAWS**

Designed for fast, easy cutting—large, deep teeth, finest Swedish charcoal steel, streamlined, laminated hardwood handles. Every model you need up to chain saw work.

**No. 20 POLE SAW HEAD**

Tough aluminum head with large hook and outside horn for pushing branches, raising wires, etc. Also paint brush holder with wire clamp that holds brush securely. Fast-cutting 16" blade. Poles available.

FREE: Send for Seymour Smith catalog pages on tools for utilities. Keep them on file for easy reference.

*Quality Tools*
SEYMOUR SMITH
*Since 1850*

SEYMOUR SMITH & SON, Inc.
2412 Main St., Oakville, Conn.


## Reynolds and Bethlehem Awarded BPA Contracts

Bonneville Power Administration has awarded Reynolds Metals Co, Louisville, Ky., a $119,260 contract for ACSR conductor and accessories for use principally in construction of the Alvey-Reston 230-kv transmission line slated for next year in southwestern Oregon.

At same time, BPA awarded Bethlehem Pacific Steel Co, San Francisco, contract for $154,756 for tower steel for building the Olympia-Shelton 115-kv No. 3, Big Eddy-The Dalles 115-kv No. 1-2 lines and the Spokane to Hot Springs relocation. Low for clearing right of way and for construction of access roads to the Olympia-Shelton line site was I. N. Saimons, Alderwood Manor, Wash., with offer of $78,425 among 15 bids ranging up to $272,789 for the work.

## Alcoa Develops Aluminum Dry Cell Batteries

Aluminum dry cell batteries with long shelf life have been developed and a variety of applications are being explored, according to the Aluminum Co of America. The aluminum cell has not reached the production stage.

The can is made up of two alloys, metallurgically bonded together. The electrolyte uses inhibitors (principally chromates). The combination has reduced the oxide formation and eliminated perforation of the can by local attack, explains J. J. Stokes, Jr, of Alcoa Research Laboratories.

The aluminum cell employs the same cathode as the zinc cell, namely a mixture of manganese dioxide and acetylene black. The aluminum cell has a potential of about 1.6 v with African ore and 1.7 v or higher with synthetic ore. Reportedly the voltage permits the cell to be used interchangeably with the zinc cell.

## Borg-Warner Acquires

Borg-Warner Corp, Chicago, Ill., has entered into an agreement for the acquisition of Primor Products, Inc, at Adrian, Mich. Primor is primarily a contract manufacturer of refrigeration units for central air conditioning systems.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Signs along the lines of *Crapo* GALVANIZED STEEL STRAND PERFORMANCE

For dependable performance . . . insist upon *Crapo* Galvanized Steel Strand. Superior tensile strength, combined with long-life, ruggedness and workability, makes *Crapo* Steel Strand first choice for guys, messenger and overhead ground wire.

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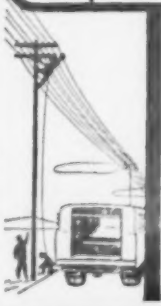

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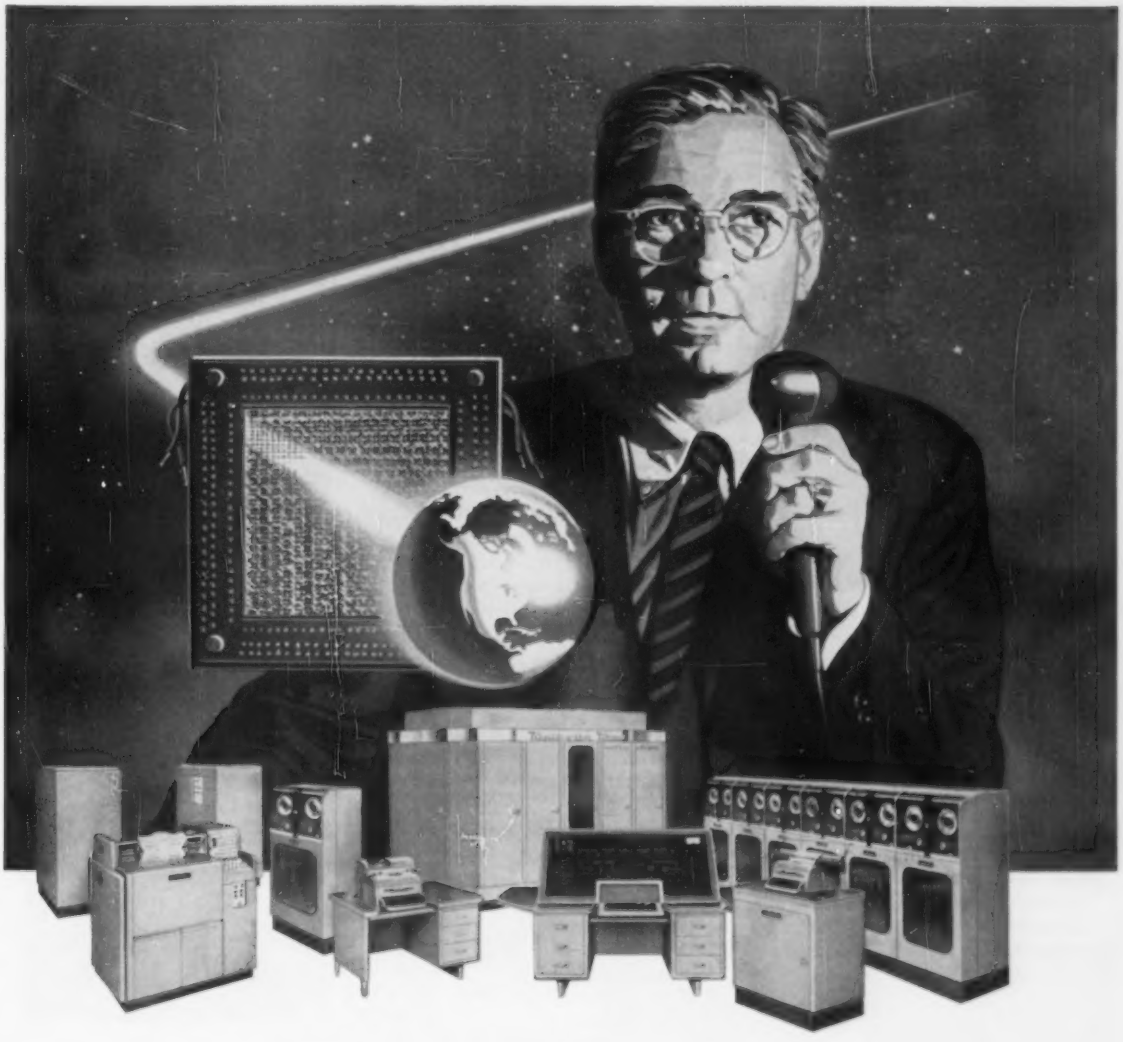


# ...now Univac's speed is doubled!

The famous Univac® of Remington Rand has widened still further its lead over other electronic business computing systems. Univac is still the *only* completely self-checked system . . . the only one which can read, write, and compute simultaneously without extra equipment. And now, the Univac II adds to these superior features the speed of a magnetic-core memory.

The Remington Rand magnetic-core memory is more than a laboratory promise. It has been in actual customer use for over a year, passing all tests with flying colors in the first commercially available electronic computer to use core storage successfully.

Univac's internal memory capacity has also been doubled, giving instantaneous access to 24,000 alpha-numeric characters. If needed, this can be further increased to 120,000 characters.

Univac's external memory—magnetic tape—now has greater capacity, too, increasing input and output to 20,000 characters per second . . . equivalent to reading or writing every character on this page over 1,000 times a minute.

These new Remington Rand developments can be incorporated into any existing Univac installation to double its speed of operation and to increase still further its proved economies.

**Remington Rand Univac**
DIVISION OF SPERRY RAND CORPORATION

ROOM 2259, 315 FOURTH AVENUE, NEW YORK 10, N. Y.

## NEWS ABOUT PEOPLE

# Green Mountain Elevates McKibben, Clewley

G. M. MCKIBBEN

Green Mountain Power Corp has elected Glen M. McKibben as president. New executive vice president is G. W. Clewley.

Executive vice president for the past year, McKibben succeeds the late John W. Sheehey, president, who died recently following a heart attack. An engineering graduate of Oregon State College, McKibben entered the utility field in 1935 at West Coast Power Co, Portland. Prior to coming to Green Mountain in 1954, he held various administrative and engineering posts with Stone & Webster Corp and affiliated companies.

Clewley, vice president and chief engineer for the past year, previously served as chief engineer for Vermont Public Service Commission, and was for several years manager of Newport (Vt.) Electric Co. Clewley's office will be moved from Montpelier to the new headquarters in Burlington.

G. W. CLEWLEY

# Commonwealth Advances Ward

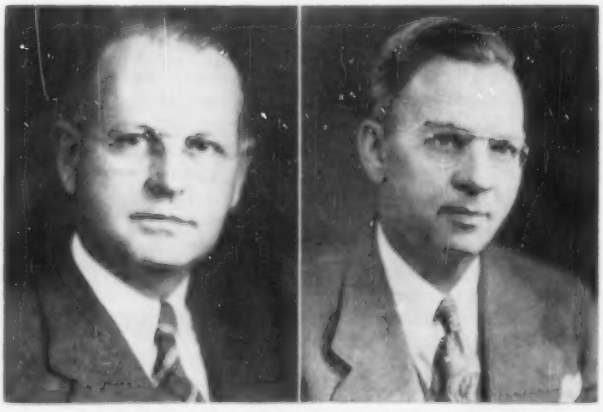
J. Harris Ward has been elected executive vice president of Commonwealth Edison Co and its Public Service Co Division, with responsibility for administration of operating and commercial activities.

Ward, whose service with Edison began in 1938, was elected secretary in 1948, and was later appointed treasurer. He subsequently served as financial vice president and as commercial vice president for two years each.

Until this election, Commonwealth President John W. Evers had served as executive vice president of Public Service, and PS President H. P. Sedwick was executive vice president of Commonwealth. Both men will continue their participation in general management of both companies.

J. H. WARD

# Corney, Regan Appointed Boston Edison VP's

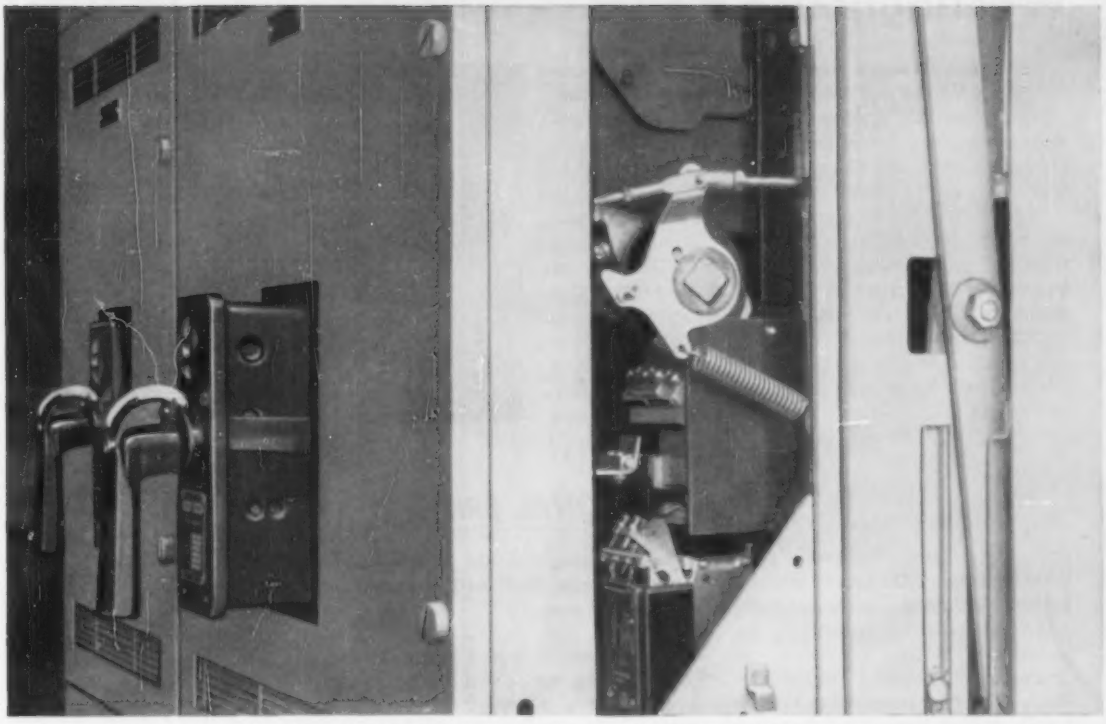


C. A. CORNEY T. J. REGAN, JR

Boston Edison Co has named Chester A. Corney vice president in charge of engineering and construction, and Brig. Gen. Timothy J. Regan, Jr, vice president, employee relations. They succeed, respectively, John T. Ward and Arthur J. McEachern, who have retired.

Following graduation from Massachusetts Institute of Technology, Corney taught at the institute for one year and then was associated with Stone & Webster Engineering Corp. Since joining Boston Edison in 1922, he has served as superintendent of electrical engineering, and assistant vice president of engineering and construction.

Since his association with Boston Edison in 1925, Regan has served as district manager, division head, assistant vice president and public relations director.



**Test position with doors closed now standard on I-T-E low voltage switchgear.** This exclusive I-T-E feature is made possible by an extendable escutcheon which permits the operating handle and visual indicator of the breaker to extend through the closed compartment door when the breaker primary contacts are disconnected. Special cutout in side sheet shows breaker within compartment.

# NOW—circuit breaker test position with doors closed

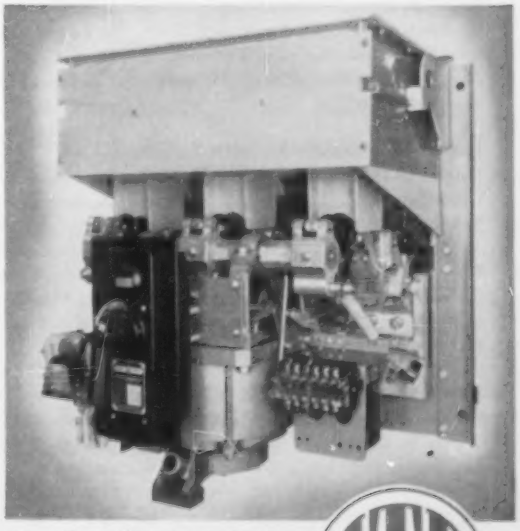
## Exclusive I-T-E low voltage switchgear feature increases safety, reduces handling, provides better dust protection, permits easier circuit identification

Consider the many advantages of testing circuit breakers with compartment doors closed or of leaving de-energized breakers in their individual compartments protected against dirt and damage during installation and shutdown. Consider, too, the simplification of maintenance, inspection and "tagging out" of circuits during normal operation. They are all yours in the modern, compact design of the new standard I-T-E Low Voltage Switchgear—at no increase in cost.

### New compact KD and KE circuit breaker design saves space

With the addition of the new KD and KE breakers, the line of K type breakers is complete through 4000 amp continuous, 100,000/150,000 amp interrupting @ 600/240 v a-c. Considerably smaller than their predecessors, Types KD and KE circuit breakers fit into three-high and two-high compartments respectively. This saves space, permits instrumentation in the same frame. In addition, the broadening of breaker interrupting ratings—now approved by NEMA—reduces switchgear costs by permitting the application of smaller size circuit breakers for short circuit protection on 240 v a-c and 480 v a-c systems.

For complete information, contact your nearest I-T-E sales office. Or write for Bulletin 6004B. I-T-E Circuit Breaker Company, 19th and Hamilton Sts., Phila. 30, Pa.



**New Type KD circuit breaker** typifies the latest design which extends the range of ratings of the I-T-E Type K family of breakers.

**I-T-E CIRCUIT BREAKER COMPANY • Switchgear Division**

# Westinghouse Elevates Witting, Craig To VP's

Westinghouse Electric Corp has announced the election of Chris J. Witting and John W. Craig as vice presidents.

Witting, recently appointed consumer products general manager, has been named vice president of Consumer Products Group, and Craig becomes vice president and general manager of Electrical Appliance Division.

In January, 1954, Witting joined Westinghouse as president of Westinghouse Broadcasting Co, Inc, wholly owned radio and television broadcasting subsidiary. Under his leadership WBC acquired TV broadcasting stations in San Francisco (KPIX) and Pittsburgh (KDKA).

Craig succeeds John H. Ashbaugh, who remains as a vice president and special consultant to Witting. Prior to joining Westinghouse, Craig was vice president of Whirlpool-Seeger Corp, and vice president, general manager of Radio Corp of America's Home Appliance Division.

C. J. WITTING J. W. CRAIG

## PERSONAL BRIEFS

Winner of American Institute of Electrical Engineers' 1955 Edison Medal is **Leonid A. Umansky,** manager of engineering, industrial engineering department of General Electric Co, at Schenectady. Umansky was cited for his "outstanding contribution to electrification of industry through the application of electrical machines . . . to automatic process machinery, and for his inspiration, leadership, and teaching of men in this work." He will receive the medal Jan. 31 at AIEE's Winter General Meeting.

**Frank R. Innes,** retired associate editor of Electrical World, has joined Electric Heat and Air Conditioning, a Heating Publishers, Inc, publication, as associate editor.

**Gilbert K. Hardacre** has been named Southern Division vice president of Commonwealth Edison Co's Public Service Division with headquarters in Joliet, Ill. He succeeds **George C. Bailey** who becomes administrative engineer under the vice president in charge of engineering, construction, and power production.

New head of Portland General Electric Co's rate and research department is **Fred R. Groch.** He succeeds **Wilbur L. Sharp** who has retired but will continue with the company on a consulting basis.

Virginia Electric & Power Co has appointed **A. H. McDowell, Jr,** division manager of the central district with headquarters in Richmond. **W. J. Mathews,** manager of the Southside district, succeeds McDowell as Richmond district manager.

Arkansas Power & Light Co's **R. E. Elliot** has been named superintendent of the utility's Northeast Division, succeeding **W. A. Bost,** who died in October.

United Gas Improvement Co has elected **Charles G. Simpson** vice president and general manager of the company's Philadelphia Gas Works Division. Simpson, former director of finance and accounts, succeeds **Thomas S. Lever,** who will retire Dec. 31.

**L. R. Cochran** has been elected president of Arkansas State Electric Co-operative, succeeding **Paul Jones.**

Dr **Jesse E. Hobson** has resigned as director of Stanford Research Institute, a post he has held since 1948. Resignation, made necessary because of health considerations, is effective next March 31. No successor has yet been named.

Benjamin Electric Manufacturing Co has announced the following executive appointments: **J. H. Fall, III,** has been elected vice president in charge of sales; **George A. Hamm** is new vice president in charge of finance; and **A. H. Franking** has been named controller of the company.

Sangamo Electric Co has elected **Maxwell O. Ehlert** controller of the company and **George E. Sangster** assistant vice president. Ehlert, who will be in charge of accounting, cost, and payroll departments, formerly served as assistant controller and assistant treasurer. Sangster will continue in his position as manager of government contracts.

New General manager of Owens-Illinois Glass Co's Libbey Glass Division is **Alexander M. Turner,** vice president, formerly in charge of personnel administration. He succeeds Vice President **Harry J. Durholt,** who has been transferred to Administration Division as consultant to the executive vice president. **William J. Stewart** replaces Turner and also continues as general manager of the company's Kaylo Division.

## OBITUARY

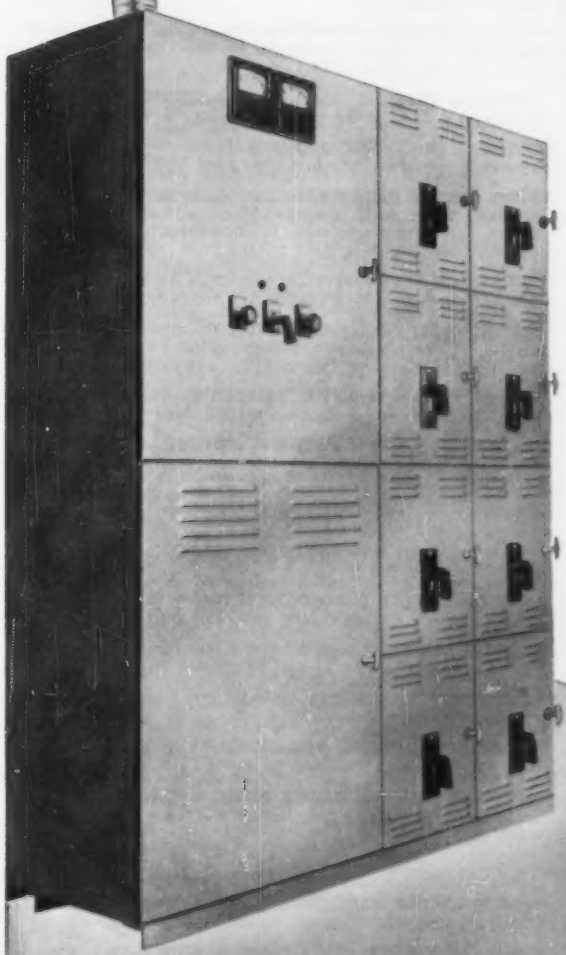
**Herbert C. Gross,** 66, manager of Philadelphia Electric Co's Delaware Division, died recently at his Bowling Green, Pa., home.

**William J. Jeffers,** 65, retired executive of American Gas & Electric System, died recently in New York. He was board member, assistant vice president, assistant secretary, and assistant treasurer of the Service Corp, and assistant secretary and assistant treasurer of AG&E.

**Augustus M. Lynch,** 68, assistant to the president of Toledo Edison Co, died in Toledo of a heart ailment.

# BUSGEAR

## CO-ORDINATED ELECTRICAL SYSTEMS OF BUSWAY and SWITCHGEAR



In modern industrial and commercial buildings, there are two major components of electrical distribution systems, *bus*way and switch*gear*.

Uni-Bus busway provides a new concept in electrical distribution. Industrial and commercial installations are more flexible, safer and truly economical with the new Uni-Bus busways.

For numerous tap-offs, as in industrial plants, the Uni-Bus plug-in system is ideal. To carry current from one point to another with only a few tap-offs, as in lighting risers in office buildings, the Uni-Bus feeder system is most economical.

To obtain maximum efficiency from the Uni-Bus system, co-ordinated overload and short-circuit protection is essential. This is accomplished best with Roller-Smith switchgear expressly designed with that aim in view. Extensive testing at Roller-Smith is the basis for sound engineering co-ordination between Uni-Bus *bus*way and switch*gear*.

That's why we selected the name BUSGEAR to identify the completely co-ordinated system manufactured by Roller-Smith under *one* roof and under the supervision of *one* Engineering Department.

Roller-Smith
CORPORATION
BUSWAY and SWITCHGEAR
BETHLEHEM, PENNSYLVANIA

# MEETINGS CALENDAR

## JANUARY 1956

**WEED SOCIETY OF AMERICA**—Charter Meeting, Hotel New Yorker, New York, Jan. 4-5; Northeastern Weed Control Conference, Annual Meeting, Hotel New Yorker, New York, Jan. 6.

* **THE INTERNATIONAL HOME FURNISHINGS MARKET**—Merchandise Mart, Chicago, Ill., Jan. 9-20.

**PERSONNEL TESTING LABORATORY**—14th Personnel Testing Institute, Rensselaer Polytechnic Institute, Troy, N. Y., Jan. 16-20.

**EDISON ELECTRIC INSTITUTE**—Dealer Coordination Committee, Chicago, Ill., Jan. 15-17; Financing & Investor Relations Committee, Hotel Biltmore, New York, Jan. 19; Industrial Relations Committee, EEI Headquarters, New York, Jan. 19; Prime Movers Committee, Warwick Hotel, Philadelphia, Pa., Jan. 30-Feb. 1.

**OKLAHOMA UTILITIES ASSOCIATION**—Accounting Section, Alvin Hotel, Tulsa, Okla., Jan. 20.

**AMERICAN SOCIETY HEATING & AIR CONDITIONING ENGINEERS**—Annual Meeting, Sheraton-Gibson Hotel, Cincinnati, Ohio, Jan. 23-25.

**NATIONAL RURAL ELECTRIC COOPERATIVE**—14th Annual Meeting, St. Louis, Mo., Jan. 23-26.

**DOBLE ENGINEERING CO**—23rd Annual Conference of Doble Clients, Sheraton Plaza Hotel, Boston, Mass., Jan. 23-27.

**AMERICAN MANAGEMENT ASSOCIATION**—General Management Conference, Fairmount Hotel, San Francisco, Calif., Jan. 24-27.

* **AMERICAN SOCIETY FOR ENGINEERING EDUCATION**—8th Annual College-Industry Conference, Marquette University, Milwaukee, Jan. 26.

**ELECTRICAL EQUIPMENT REPRESENTATIVES ASSOCIATION**—Annual Meeting, Edgewater Beach Hotel, Chicago, Ill., Jan. 26-28.

**AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS**—Winter General Meeting, Hotel Statler, New York, Jan. 30-Feb. 3.

## FEBRUARY

**EDISON ELECTRIC INSTITUTE**—Conference Planning sponsored jointly with AGA, William Penn Hotel, Pittsburgh, Pa., Feb. 2-3; Transmission & Distribution Committee, Warwick Hotel, Philadelphia, Pa., Feb. 7-8; Electrical Equipment Committee, Homestead, Hot Springs, Va., Feb. 13-14; Commercial Lighting Committee, Hotel Shoreham, Washington, D. C., Feb. 15-16; Meter & Service Committee, Hotel Cleveland, Cleveland, Ohio, Feb. 20-22.

**GREAT LAKES POWER CLUB**—LaSalle Hotel, Chicago, Ill., Feb. 2-3.

**MISSOURI VALLEY ELECTRIC ASSOCIATION**—Industrial & Commercial Sales Conference, President Hotel, Kansas City, Mo., Feb. 2-3.

**INDUSTRIAL ELECTRIFICATION COUNCIL**—National Industrial Electric Heating Conference, Netherland Plaza Hotel, Cincinnati, Ohio, Feb. 6-10.

**PENNSYLVANIA ELECTRIC ASSOCIATION**—Relay Committee, Benjamin Franklin Hotel, Philadelphia, Pa., Feb. 9-10; Electrical Equipment Committee, Penn Harris Hotel, Harrisburg, Pa., Feb. 9-10; Systems Operation Committee, Hotel Statler, New York, Feb. 16-17.

**SOUTHEASTERN ELECTRIC EXCHANGE**—Personnel Administration Section, Buena Vista Hotel, Biloxi, Miss., Feb. 9-10.

**ROCHESTER ELECTRICAL EXPOSITION**—War Memorial Building, Rochester, N. Y., Feb. 18-25.

**NATIONAL ADEQUATE WIRING BUREAU**—12th Annual Conference, LaSalle Hotel, Chicago, Ill., Feb. 23-24.

* **AMERICAN MANAGEMENT ASSOCIATION**—2nd Annual Electronics Conference & Exhibit, Hotel Commodore, New York, Feb. 27-29.

**AMERICAN SOCIETY FOR TESTING MATERIALS**—Committee Week, Hotel Statler, Buffalo, N. Y., Feb. 27-March 2.

## MARCH

* **SOUTHERN SAFETY CONFERENCE, INC.**—Southern Safety Conference & Exposition, Hotel Biltmore, Atlanta, Ga., March 4-6.

**SOUTHEASTERN ELECTRIC EXCHANGE**—23rd Annual Conference, Boca Raton, Fla., March 12-14.

**NATIONAL ASSOCIATION OF CORROSION ENGINEERS**—12th Annual Conference, Hotel Statler, New York, March 12-16.

**NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION**—Edgewater Beach Hotel, Chicago, Ill., March 12-16.

**AMERICAN SOCIETY OF MECHANICAL ENGINEERS**—Spring meeting, Multonomah Hotel, Portland, Ore., March 18-21.

**ILLINOIS INSTITUTE OF TECHNOLOGY**—18th Annual American Power Conference, Hotel Sherman, Chicago, Ill., March 21-23.

**OKLAHOMA UTILITIES ASSOCIATION**—Annual Convention Biltmore Hotel, Oklahoma City, Okla., March 22-23.

**PACIFIC COAST ELECTRICAL ASSOCIATION**—Engineering & Operating Section, Palace Sheraton, San Francisco, Calif., March 22-23.

## APRIL

* **AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS**—South West District Meeting, Baker Hotel, Dallas, Tex., April 2-4; Great Lakes District, Fort Wayne, Ind., April 16-18.

**ELECTRICAL MAINTENANCE ENGINEERS ASSOCIATION**—8th National Biennial Electric Industry Show, Shrine Exposition Hall, Los Angeles, Calif., April 5-7.

* **MIDWEST RESEARCH INSTITUTE**—Symposium for Management on Applications of Analog Computers, University of Kansas City, Kansas City, Mo., April 10-11.

* **POINT OF PURCHASE ADVERTISING INSTITUTE**—10th Annual Symposium & Exhibit, Hotel Sheraton Astor, N. Y., April 10-12.

**SOUTHEASTERN ELECTRIC EXCHANGE**—Engineering & Operation Section, Bon Air Hotel, Augusta, Ga., April 12-13.

**EDISON ELECTRIC INSTITUTE**—National Conference of Electric & Gas Utility Accountants, sponsored jointly with AGA, Hotel Commodore, New York, April 16-18; Accident Prevention Committee, Sheraton Hotel, St. Louis, April 30-May 2.

**GREATER NEW YORK SAFETY COUNCIL**—26th Annual Safety Convention & Exposition, Hotel Statler, New York City, April 16-20.

* **PACIFIC COAST ELECTRICAL ASSOCIATION**—Administrative Services Section Meeting, Huntington-Sheraton Hotel, Pasadena, Calif., April 17-18.

**MISSOURI VALLEY ELECTRIC ASSOCIATION**—Engineering Conference, Hotel President, Kansas City, Mo., April 18-20.

**AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS**—2nd Conference on Recording & Controlling Instruments, Bradford Hotel, Boston, April 26-27.

## MAY

* **NATIONAL FARM ELECTRIFICATION CONFERENCE**—LaSalle Hotel, Chicago, Ill., May 1-2.

* **AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS**—North Eastern District Meeting, Rochester, New York, May 2-4.

* **AIR-CONDITIONING & REFRIGERATION INSTITUTE**—Annual Meeting, The Homestead, Hot Springs, Va., May 7-9.

* **PACIFIC COAST ELECTRICAL ASSOCIATION**—Annual Convention, Las Vegas, Nevada, May 14-16.

* **PENNSYLVANIA ELECTRIC ASSOCIATION**—Relay Committee, Hotel Roosevelt, Pittsburgh, Pa., May 17-18.

* **NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION**—Business Development Section Meeting, Benjamin Franklin Hotel, Seattle, Wash., May 21-23.

## JUNE

* **EDISON ELECTRIC INSTITUTE**—24th Annual Convention, Atlantic City, N. J., June 4-7.

* **AMERICAN SOCIETY FOR TESTING MATERIALS**—59th Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 17-22.

* Additions this week

## Tests Conserve Kva

(*Continued from page* 63)

capability of a 3 and a 5-kva transformer. The capability of a 3-kva transformer is already exceeded. The installation of a 5-kva unit provides capacity for three years of load growth at a rate of 10% per year. Of customers tested in this category, those having normal household appliances and minor farm equipment, the capacity for growth on a 5-kva transformer varied from three to six years. This customer had the highest density of electrical equipment.

### Kva Usually Adequate

At the present cost of material, labor, and plant investment, a transformer replacement that allows for at least three years of load growth is justified economically. The 5 kva transformer was installed.

Recorded load tests on transformers serving two or more farm customers indicated in most cases that a 5-kva transformer is inadequate to serve immediate load or to provide a reasonable margin for load growth. Where two or more farm customers are served from the same transformer, secondaries are usually required. It is then advisable, if not for transformer capacity needs, to install at least a 10-kva transformer to reduce voltage drop in the secondary.

Transformers are as close to the farm customer load as practicable. This holds customer voltage regulation within tolerable limits even during heavy load conditions.

### Central Point Favored

The "central point distribution" method of serving large farm customer loads has gained in acceptance recently. In such an arrangement the farm customer is metered on the transformer pole, and overhead wires go to load centers throughout the farm. This improves voltage regulation throughout the farm by eliminating a large part of the voltage drop caused by carrying all of the farm load through a single service drop.

Where the substation or line voltage regulator is remote, or a secondary, is between the transformer and the customer service drop, consideration is given to improving primary voltage, relocating the transformer closer to the load, or installing the next larger size transformer beyond load capacity needs.

The listing of equipment is standard procedure for farm customers reaching a demand of 7.5 kw or more. Each new list is reviewed, and arrangements made for tests at customers having major equipment not included in existing test results. As new results are compared, the rules governing transformer replacements may be altered somewhat.

## Long Span Planned

### . . . by Canada's B. C. Electric with 10,000-ft long overhead cables across Jervis Inlet

Initial survey work has been completed to span Jervis Inlet on the British Columbia coast with one of the longest overhead power line crossings in the world to supply the pulp and paper town of Powell River, about 90 mi north of Vancouver.

Tom Ingledow, vice president and executive engineer of British Columbia Electric Co, revealed plans for the $600,000 undertaking. The line will be a vital link in his company's project to build a 100-mi, $3-million transmission line to start delivering 132,000v into the area by October 1956.

Four steel cables, each 1¼-in. thick and 10,000 ft long, will be strung between anchor towers located at the 1,600-ft level on the north mainland side. Roads now are being built through the coastline wilderness to the tower sites.

A second crossing, similar in design and measuring 6,500 ft long, will be constructed over Agamemnon Channel to the west of Jervis Inlet.

Crossing of Jervis Inlet will be a major engineering feat requiring surveys of an accuracy which will permit an error of not more than 1-ft in 10,000 ft.

A new synthetic tape, which will not expand or contract as temperatures change, will be used to mark off a 1-mi base line for the survey.

Towers, each about 70 ft high, are to be installed in April. Cable will be strung across the inlet in June or July of 1956 if the present plans materialize.

BCE engineers decided on an overhead, rather than underwater, cable because of heavy currents and the rough bottom of Jervis Inlet.


Seal oil IN!
Seal moisture OUT!

with

J-M TRANOLSEAL

developed especially for efficient sealing against

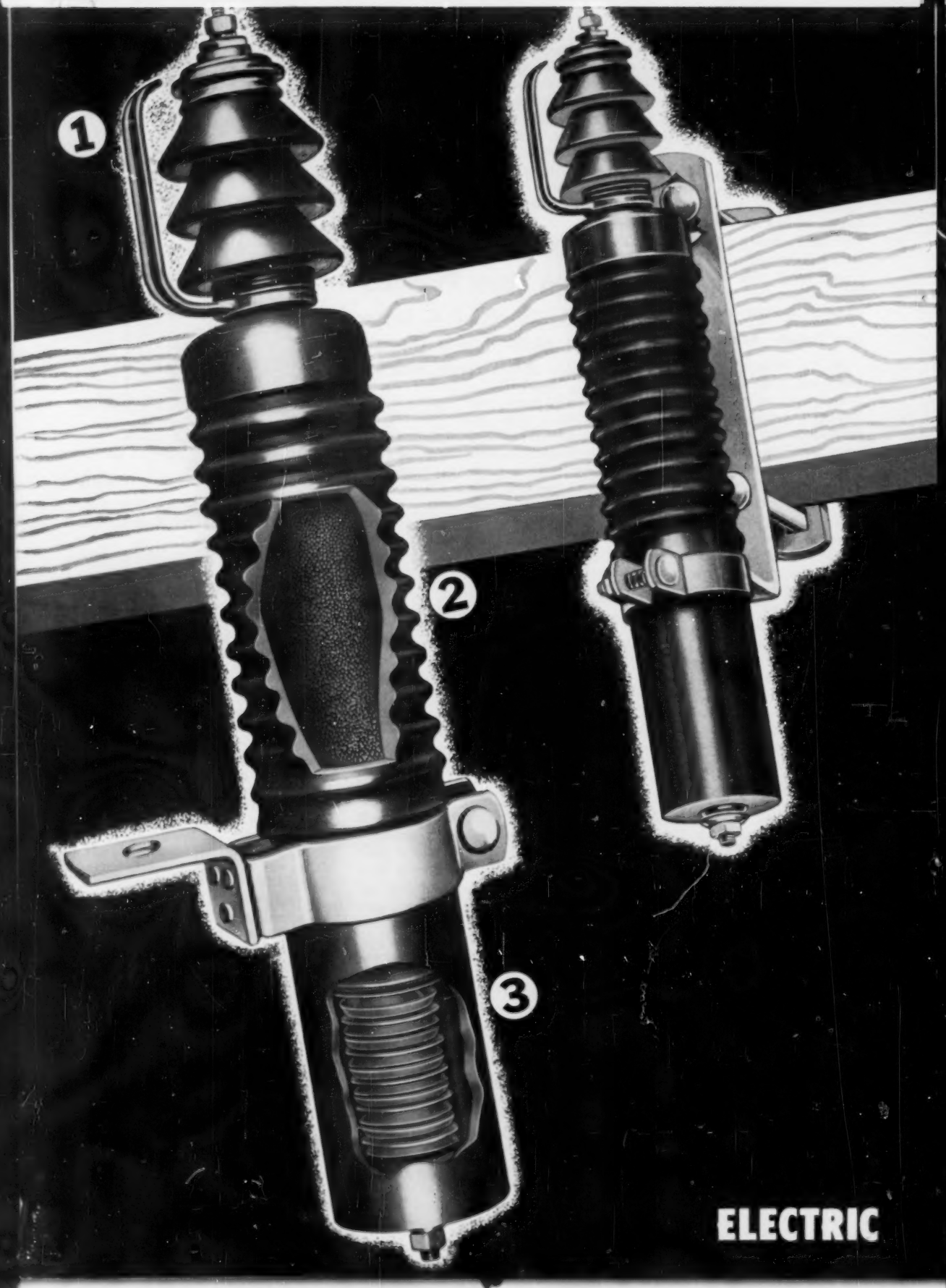
refined oils

You can stop the dangerous and costly leakage of oil from transformers and switchgear with Johns-Manville's Tranolseal sealing compound. This permanently plastic material has a nondrying vegetable oil base. It provides effective sealing action against air (dust and moisture), inert gas, water, 13% NaCl brine as well as medium to high viscosity refined oils. Thus you can also prevent penetration by moisture and other ambient sources of trouble.

Tranolseal has excellent adhesive qualities and will not corrode or deteriorate metals, rubber or plastics. It shows good resistance to weather and aging (both painted and natural) and won't stain. Furnished in 1" diameter beads. For further information write Johns-Manville, Box 60, New York 16, N. Y. In Canada, Port Credit (Toronto), Ontario.

JM

Johns-Manville
SEALING COMPOUNDS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ELECTRIC

# PROVIDE BEST PROTECTION
## With Isolating External Gap
# VALVE Arresters

These isolating external gap arresters are the result of Electric Service development and field engineers taking all of the finest service-proved features of Crystal Valves . . . putting them into one arrester . . . and adding a feature sought by thousands of utility men.

1. **The isolating external gap provides positive protection from line lockouts.**

2. **Exclusive "T" Grain Silicon Carbide valve element is unaffected by moisture or age. It has the highest thermal and surge current capacity of any valve element material.**

3. **Ultra-Speed Multiple Arcing unit, coordinated with external gap results in impulse sparkover slightly higher than the standard Crystal Valve, but below the industry average for all valve type arresters. This is true even with the arrester bracket not grounded.**

These isolating external gap Crystal Valve Lightning Arresters are available in vented or non-vented construction for both cross-arm or tank mounting. Their applications are not limited by values of surge or fault current. Write today for full details on these service-proved external gap VALVE arresters.

**SERVICE MANUFACTURING CO.** Philadelphia 32, Pa.

# EMPLOYMENT OPPORTUNITIES

The Advertisements in this section include all employment opportunities—executive, management, technical, selling, office, skilled, manual, etc.

**Positions Vacant**
**Positions Wanted**
**Part Time Work**
**Civil Service Opportunities**
**Selling Opportunities Wanted**
**Selling Opportunities Offered**
**Employment Agencies**
**Employment Services**
**Labor Bureaus**

**DISPLAYED** ——**RATES**—— **UNDISPLAYED**

The advertising rate is $19.15 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on a column—3 columns—30 inches to a page.

Subject to Agency Commission.

$1.50 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Box Numbers—counts as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Not subject to Agency Commission.

Send NEW ADS to ELECTRICAL WORLD, 330 W. 42nd St., N. Y. 36, N. Y., for January 9th issue closing December 29th

## POWER PLANT PERSONNEL

**A middle east coast utility now constructing a new high pressure, pulverized fuel generating station will accept applications for employment from qualified persons for the following positions, which are available immediately:**

### Results or Test Engineer

Must be graduate mechanical engineer or equivalent, with experience in modern power plant operation and three years in a responsible supervisory results position. Will be required to assume full charge of power plant testing, chemical control, accounting and research.

### Assistant Results or Test Engineer

Graduate mechanical engineer or equivalent, with experience in power plant test and technical work. Will conduct tests and research and maintain records under direction of the Results Engineer.

Job is located near excellent residential community, good working conditions, forty hour week (paid vacations, insurance, sick pay and retirement plan).

High caliber men are needed to fill the foregoing jobs, and for applicants meeting the above requirements, consideration will be given to reimbursement of expenses incurred for moving of household goods and personal effects.

Personnel selected will receive training at full pay in order to familiarize themselves with the plant before assuming their duties. Include a complete resume of experience and qualifications in first letter. All applications will be treated confidentially.

P-8298, Electrical World
330 W. 42 St., New York 36, N. Y.

## RESEARCH ENGINEER

Graduate Electrical Engineer for work on electrical conductors. Will study, by measurement, such electrical characteristics as electrical conductivity, d-c and 60 cps a-c resistance, reactance, current rating, overload characteristics and check test results against theory. Familiarity with this specialized field desirable but not necessary. Required is a predilection for accurate experimental work, and a sufficiently broad physical and mathematical knowledge to analyze and interpret the results and to present them clearly in a well organized manner. Please reply to:

**Dr. E. W. Greenfield**
**Kaiser Aluminum & Chemical Corporation**
**Department of Metallurgical Research**
**Spokane 69, Washington**

## JUNIOR DISTRIBUTION ENGINEER

**Electric utility serving in the East desires a graduate electrical engineer with some experience in the distribution field, preferably with a public utility. Permanent position—salary dependent on experience and ability. Applicants please include complete resume of experience and qualifications.**

P-8221, Electrical World
330 W. 42 St., New York 36, N. Y.

## UTILITY EXECUTIVE ENGINEER

**LOCATION:** Fast growing electric utility company in a large, progressive city in Florida, the nation's number one state in rate of industrial growth, and number two state in population growth.

**RESPONSIBILITIES:** Management of all engineering operations of company. Supervision and training of engineering department.

**EXPERIENCE:** Diversified engineering background in electric utility company, including a minimum of three years supervising engineers. Individual must have leadership ability, with potentiality for further advancement. Ability will be regarded as of greater importance than just years of experience.

**AGE:** 35-45 desirable.

**SALARY:** Commensurate with the high level qualifications demanded by the position.

**REPLY:** Confidentiality assured. Write, giving summary of qualifications to

P-8302, Electrical World
330 W. 42 St., New York 36, N. Y.

*REPLIES (Box No.): Address to office nearest you*
*NEW YORK: 330 W. 42nd St. (36)*
*CHICAGO: 520 N. Michigan Ave. (11)*
*SAN FRANCISCO: 68 Post St. (4)*

### POSITIONS VACANT

**Junior Electrical Engineers—Five graduates** for power stations and substation electrical design. Location New York with established Service Organization for a large group of electrical utilities. Requirements: 1 to 3 years with leading electrical equipment manufacturer, G.E. or Westinghouse test course, or actual electric design, operation, construction experience on steam, diesel or hydro plants and substations. Limited foreign travel possibilities in future. Reply stating age, education, experience, personal particulars, and minimum salary expected. P-8693, Electrical World.

**Recent civil engineer graduate to work for** large electric power utility on transmission line layout and design. Experience desired but not essential. Age up to 30. Some travel required. Give resume of education, experience and references. P-8562, Electrical World.

**Graduate Electrical Engineers with or without** experience for electric public utility. System protection, substation and distribution design work available. Please write full particulars: Personnel Director, P. O. Box 330, Hartford 15, Connecticut.

**Electrical Engineer—Graduate—2 to 5 years** experience—protective relay work with electric utility. Permanent position long established supervisory-consulting organization. Headquarters New York. Some travel Latin America. Salary commensurate with experience. Reply stating age, education, experience, personal particulars and minimum salary expected. P-8694, Electrical World.

**Young Electrical Engineer—Power Option—** Recent graduate or man with 1 or 2 years experience. Good opportunity. Permanent position with long established electric utility in Costa Rica. Knowledge Spanish necessary. Reply stating age, education, experience, personal particulars and minimum salary expected. P-8695, Electrical World.

### EMPLOYMENT SERVICES

**Salaried Personnel, $5,000-$30,000.** This Confidential service established 1920, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, P. O. Box 674, Manchester, Vermont.

### SELLING OPPORTUNITY WANTED

**Electrical Manufacturers agent. North and** South Carolina, calling on distributor, industrial and OEM accounts, warehouse, office staff, 2 salesmen on road. Desire affiliation with live accounts this area. Commission basis only. RA-8731, Electrical World.

## FOR RATES OR INFORMATION About Classified Advertising

*Contact The McGraw-Hill Office Nearest you.*

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WAlnut 5778
W. LANIER

BOSTON, 16
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HUbbard 2-7160
P. McPHERSON

CHICAGO, 11
520 No. Michigan Ave.
MOhawk 4-5800
H. BOZARTH
W. HIGGENS

CLEVELAND, 15
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SUperior 1-7000
C. J. LOUGHLIN

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Main & Akard Sts.
PRospect 5064
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J. WILLIS

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JEfferson 5-4867
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SAN FRANCISCO, 4
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*Personnel Managers*

# Looking for Engineers . . . Technicians?

Write for free copy of

## "RESERVOIR of ENGINEERS and TECHNICAL MEN"

The engineers and technicians you want to reach are gathered in convenient, compact groups — as this 12-page booklet points out.

It keys the job titles these men hold to the McGraw-Hill publications they read for on-the-job information. It explains how you can make contact . . . channel, concentrate your employment advertising to just the men with the job qualifications you want . . . without wasting advertising money for higher-priced space in publications with general circulation, in which you pay for perhaps 999 unqualified readers for every 1 who may meet your job requirements.

*Write for your free copy to*
Classified Advertising Division
**McGraw-Hill Publishing Co., Inc.**
330 W. 42nd St., N. Y. 36, N. Y.


# SEARCHLIGHT SECTION

*(Classified Advertising)*

BUSINESS OPPORTUNITIES · EQUIPMENT - USED or RESALE

*UNDISPLAYED* —RATES— *DISPLAYED*

$1.50 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

BOX NUMBERS count as one line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals.)

The advertising rate is $14.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured 7/8 inch vertically on one column, 3 columns—30 inches to a page.

EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

*Send NEW ADVERTISING to N. Y. Office, 330 W. 42nd St., N. Y. 36, N. Y. for January 9th issue closing December 29th*


**ELECTRICAL WIRE AND CABLE**

—YOUR BEST SOURCE—

• for every industrial and power application
• Odd lengths—long and short—reasonably priced

**One of the Largest Stocks in the Midwest**

Let us quote on requirements—
send your inquiries
We'll also buy your Surplus

*Branch Offices:*

Houston— Walnut 3-4580
Los Angeles— ANgeles 3-5148

FOR YOUR TEMPORARY NEEDS TRY OUR SURPLUS DIVISION

**UNIVERSAL Wire and Cable Co.**

2664M N. Clybourn Ave., Chicago 14, Ill.
EAstgate 7-4777 Code: UNIWIRE


### PERIODICALS

**A.I.E.E. transactions back-volume wanted to** buy for cash. Ashley, 27 E. 21, N.Y.C. (10).

### U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-4592) will be received at Denver, Colorado, until January 31, 1956, for furnishing three control boards, designated CHB, CHD, and CHA, respectively; and two supervisory control and telemetering switchboards, one for controlling station and one for controlled station; Granite Falls and Watertown Substations, Missouri River Basin Project, South Dakota. Delivery is desired within 240 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver 2, Colorado. W. A. Dexheimer, Commissioner.


**CIRCUIT BREAKER SWITCHES**

Mfg. by Hopax Electric Co., Chicago, Ill. Model P.M.B-25 125 Volts A.C. 8 Amps. Original Factory Cost $1.25 each.

**Our Price 25 cents each.**

5000 pieces available.

**G. & M. MATERIALS CO.**
Townsend 8-6830 12955 Hamilton Av., Detroit 3, Mich.

***Your Inquiries to Advertisers Will Have Special Value . . .***

—for you—the advertiser—and the publisher, if you mention this publication. Advertisers value highly this evidence of the publication you read. Satisfied advertisers enable the publisher to secure more advertisers and—more advertisers mean more information on more products or better service—more value—to YOU.

# TRANSFORMERS

**FOR SALE**

3—1000 Kva Mol. 11500-2400/4160Y
3— 500 Kva W-H 33000-2300/2400
3— 500 Kva G-E 22000-2300/4000Y
5— 333 KVA W-H 36000-7200/12470Y
3— 333 KVA G-E 23000-2300/4000Y/6900/11950Y
3— 333 KVA G-E 7200/12470Y-2400/4160Y
3— 250 Kva G-E 2415/2300-600
6— 200 KVA G-E 13200-2400/2300
6— 200 KVA G-E 13200-230/460
1—1500 KVA W-H 34500-2400/4160Y 3-ph., with substation equip't

Many other items in stock

**TRANSFORMERS WANTED**

Reliable rewind and repair service on all makes of transformers

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## WASHINGTON COMMENT

# Would European Atom Pool Compete?

**Key plank in U. S. Foreign policy is to help create a central nuclear development effort in West Europe. How much will U. S. industry have to sacrifice?**

The Eisenhower Administration is backing to the hilt the proposed plan for a European international atomic power pool. Plans for EURATOM, the supranational agency, are top on the list of foreign policy objectives since failure to obtain agreement with the Russians on German unification at Geneva last month.

The U. S. is going to have to alter its policies to provide more in the form of atomic aid than is now available to foreign countries under the 1954 Atomic Energy Act. Both Republicans and Democrats are pressing for a stronger foreign policy and trying to keep this country out in front in the atom field. Not too much difficulty is expected in putting over this policy revision.

U. S. officials take the view that Europe is going to have an atomic industry; and unless we provide the know how and materials, the Russians will.

### West Germany May Be Kicker

Already, six countries—France, Germany, Italy, Belgium, Holland, and Luxembourg—are working out their end of the arrangement. Britain has been cooperating, and there's a feeling she will eventually join up. Kicker in the deck may prove to be West Germany. Chancellor Conrad Adenauer is for EURATOM, but some of its top industrialists are opposed to the plan because they want to do it for themselves. However, the U. S. will put pressure on West Germany and can indeed use threats if need be in the larger battle between West and East Germany.

As now proposed, EURATOM would come under direct supervision of the European Coal-Steel Community High Authority (the Schumann Plan). The authority would oversee location of nuclear power plants, channeling of atom fuel supplies, financing, and marketing, and allocation of power.

The U. S. Atomic Energy Commission is working up a new system under which foreign nations would be entitled to the technical information and fissionable materials required to set up a nuclear power program. Only three nations—Britain, Canada, and Belgium—now qualify for more than research-reactor quantities of nuclear materials and a like quantity of classified information. More than a score of additional bilateral agreements have been signed with other nations by this country, but none of these provides for the exchange of classified information or more than a token amount of atomic fuel needed to operate research plants. As of now EURATOM is not provided for in the new plan.

### Could Mean Loss To U. S.

To U. S. industry, including utilities, the new plan will mean "stealing" from the American atomic stockpile, in a sense. That is, military demand being what it is during the cold war, all U. S. output of fissionable materials is technically needed for bomb materials, and every ounce of refined uranium which goes into any other effort in effect means one ounce less for the strategic bomb stockpile. This includes distribution to the American power program.

It also means the growth of foreign competition, both economic and military. Obviously, to help industrial firms in other countries build and operate their own reactors means that in time the operators of these facilities will learn enough to compete with American exporters. Perhaps, even, enough to compete here in the American market.

The kind and amount of assistance the U. S. will give to EURATOM still haven't been spelled out. There will be bitter policy clashes within the Administration before it is.

A key issue will be how much knowhow and fissionable material to contribute. Many top officials in AEC and the Pentagon strongly oppose taking the security risks involved in all out cooperation with EURATOM. Information still classified top secret by AEC would be needed. Beyond that the U. S. would be called on for substantial amounts of fissionable materials. And nuclear power plants produce plutonium which is used in bombs.

## TECHNICAL NOTES

**A portable gasoline-driven air compressor** adjustable between 100 and 350 psi saves permanent compressors during air circuit breaker tests and provides an emergency air supply in case a permanent compressor fails.

**Numbers printed on checks** with special magnetic ink are read at 100 checks per min for bank accounting by a magnetic scanner which detects the "wave form" of conventional numbers. This technique might be adopted to automatic analysis of system load data.

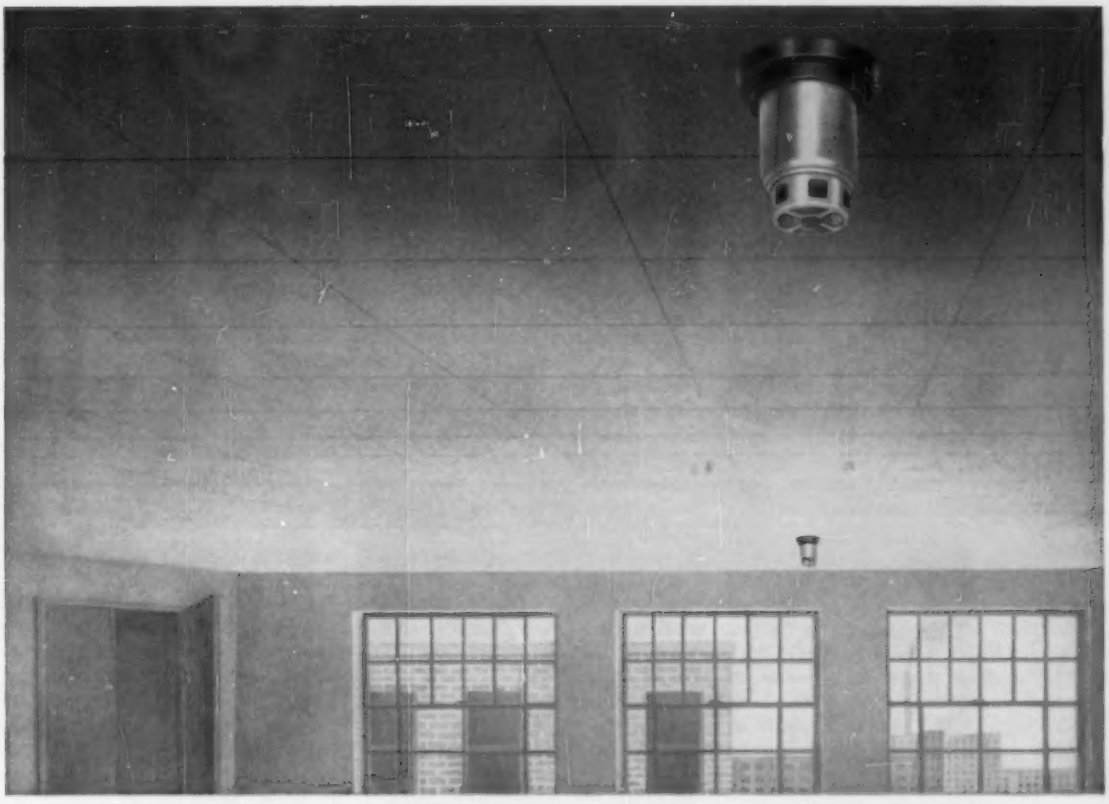
**Stainless steel** may be used to retube condensers in areas where corrosion has been excessive.

**Synthetic resin** can insulate and house instrument transformers up to 60 kv.

**Operation of a nuclear power plant** will differ little, except in terminology, from conventional fossil-fuel plant practice. But sudden shut down will pose problem of removing heat of radioactive processes already initiated.

# New, radio-active, automatic fire guard!

## C-O-TWO PRE-DETECTOR SYSTEM



Each pre-detector head protects up to 3,600 square feet of area . . . harmless radio-active element utilizing ionization chamber principle quickly detects all forms of fire . . . requires only simple two-wire circuit and insignificant wall space for controls.

This completely new and positive means of spotting fire is just what you've always needed and wanted . . . detects in the earliest stage, invisible combustion gases, visible smoke, slow smoldering, as well as open flame. The C-O-TWO Pre-Detector System is simple to install, extremely economical to maintain and doesn't depend on thick smoke or heat for actuation.

As many pre-detector heads as necessary can be connected together in a single circuit and up to 16 separate circuits or spaces handled by one system. With a single circuit the pre-detector heads are connected directly to the fire indicating cabinet, while with multiple circuits the pre-detector heads are first connected to one or more space indicating cabinets capable of visually showing by number the exact location of the fire. Relays perform such functions as sounding alarms, closing fire doors, shutting down ventilation and releasing fire extinguishing systems.

The C-O-TWO Pre-Detector System has been subjected to extensive testing and carries Underwriters' Laboratories, Inc. listing, as well as Factory Mutual Laboratories approval. Proven pilot installations have been made in such diversified properties as a television station, an electric power company network analyzer room, a railroad signal tower, an airline flight training equipment room and the offices of an insurance company.

Don't take unnecessary chances any longer . . . the extensive fire protection experience of PYRENE—C-O-TWO over the years is at your disposal without obligation. Get complete facts about this new C-O-TWO Pre-Detector System today!

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## FINANCE AND REGULATION

# Ford Stock's Impact On Utilities

If you had between $400 million and $500 million to invest, how would you invest it? For the directors of the Ford Foundation this isn't an academic question, but a very practical one. Early next year after they have sold 15% of its holdings in the Ford Motor Co, they will have to answer it. How they answer it can mean much to the electric utility industry.

### Impact on Utility Securities

Some of that money would have been invested in electric utility securities if the Ford stock were not being offered in the market. Why? Because this will be the first public sale of Ford stock, and it seems likely to prove very popular. Therefore, many individual and institutional investors may lighten their holdings of other securities to obtain sufficient cash to subscribe liberally for the new Ford offering.

The Ford Foundation is a tax-free philanthropic institution. Based on a $450-million return on the sale of 15% of its Ford stock, its assets are $3 billion. The admitted purpose of the sale is to enable the foundation to diversify its investments.

### How Will Trustees Invest?

The diversification and reinvestment will be controlled by the board of trustees of the Ford Foundation. They will have the benefit of the recommendations of the foundation's Finance Committee, composed of Charles Wilson, as chairman (presently chairman of the board of W. R. Grace & Co), John McCloy (chairman of the board of Chase Manhattan Bank), James F. Brownlee (partner of J. H. Whitney & Co, investment bankers), and H. Rowan Gaither (president of the Ford Foundation).

The aggregate knowledge and experience of this group will be augmented by the advice of Donald Smith, former partner of Scudder, Stevens & Clark, a Boston investment counseling firm, and of William R. Biggs, vice president and economist of the Bank of New York.

This is the group then which will have to invest the largest amount of money ever available at one time to a single investor. (The sale of the Ford stock will be the largest of a single security in a private company to be made to the American public.)

Recently announced grants of over $500 million to colleges, universities, medical schools, and hospitals by the foundation should not materially reduce the proceeds of Ford stock to be reinvested. It is understood that these grants will be payable in about equal installments some six and eighteen months hence. Therefore these grants will come from funds provided principally from income of the foundation. What new securities is the foundation likely to buy?

Municipal and other non-taxable bonds would not be attractive because of their low yields, for taxes need not be considered as the foundation is a non-taxable organization.

But higher yield taxable bonds appear to be a reasonable first choice especially since the foundation is not known to have any. A fair "guesstimate" would see two-thirds of the proceeds or $300 million going into these bonds. What kind?

The yield on government bonds is so low that it is likely that the majority of the bond money will go into corporate bonds. A good guess might be $200 million.

### Stability Factor Important

Of this $200 million how much will go into utility bonds and of this portion how much will go into electric utility bonds? This is a little hard to guess. Solely on the basis of reasoning, it may be assumed the foundation in buying corporate bonds would seek primarily the element of stability. Let's remember 85% of the foundation's assets will still remain in the common stock equity of an industrial corporation. Utility bonds have a high degree of stability, and electric utility bonds rank among the best. So perhaps $150 million in electric utility obligations, or some amount approaching it, wouldn't be too unreasonable to anticipate.

Coming next to the equity portion of the investment, "the guesstimate" places this at $150 million, one-third of the proceeds. How much will be used for electric utility equities?

Again the factor of stability enters. Utilities have it. As to yields, they are now as high or higher on electric utility equities than on "blue chip" industrials of the character the foundation would be likely to buy; so substantial investment in electric utility common stocks would augment income. Besides, electric utilities offer attractive growth possibilities. Considering all of these factors, it does not seem that a guess of $75 million is excessive.

### Market Won't Be Upset

So in both bonds and equities the foundation is likely to invest as much as $225 million in electric utility securities, if this "mildly inspired" guessing proves correct.

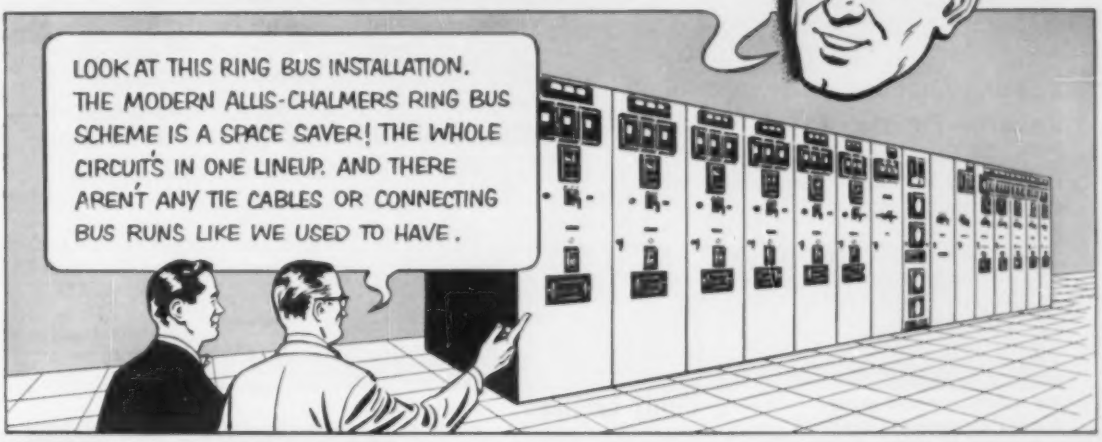
Considering the high ability and character of those in charge of the foundation, it is unlikely that they will do anything to "rock" the market. This would indicate that most likely the money will not be dropped into the market in a lump but will slowly be funneled into it. The logical way of doing this would be to invest the larger portion temporarily in Treasury bills or similar investments. How long it would take to transfer from these temporary into permanent investments is anybody's guess. Two months or two years seem quite likely. Time alone will tell.

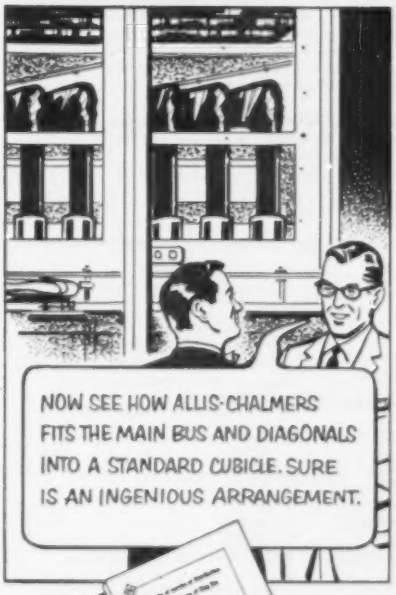
### Byproduct Gains Cited

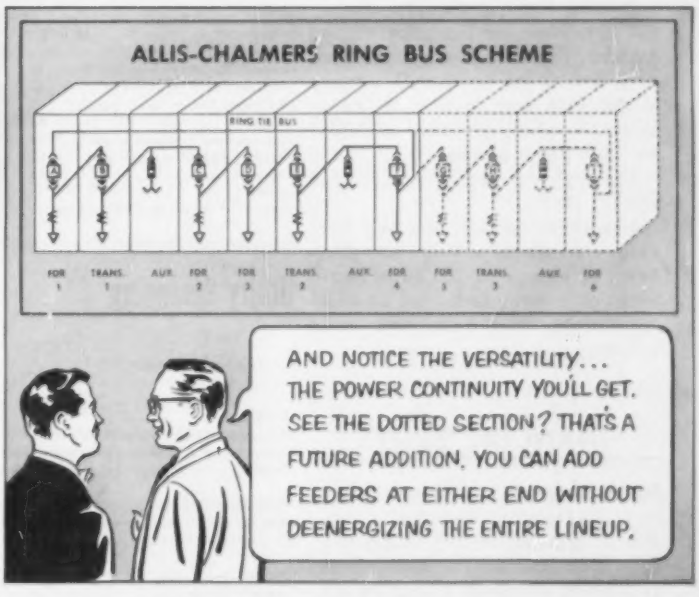
As a byproduct of the coming sale of Ford stock, the electric utility companies may be big gainers. For some time money has been withheld from the market to accumulate funds to make a maximum subscription for the Ford equity. It is quite likely that the offering will be heavily oversubscribed. Unused funds may be quite large. These will then be available for other investments. So utilities offering new securities shortly after completion of the Ford deal may be the beneficiaries of this interplay of financial forces, by obtaining lower yields for their new offerings.

# "Jim Showed Me I Was Wrong About the Ring Bus...

## I didn't realize it could be so compact...so easy to expand"


LOOK AT THIS RING BUS INSTALLATION. THE MODERN ALLIS-CHALMERS RING BUS SCHEME IS A SPACE SAVER! THE WHOLE CIRCUIT'S IN ONE LINEUP. AND THERE AREN'T ANY TIE CABLES OR CONNECTING BUS RUNS LIKE WE USED TO HAVE.





ALLIS-CHALMERS RING BUS SCHEME
RING TIE BUS
AND NOTICE THE VERSATILITY... THE POWER CONTINUITY YOU'LL GET. SEE THE DOTTED SECTION? THAT'S A FUTURE ADDITION. YOU CAN ADD FEEDERS AT EITHER END WITHOUT DEENERGIZING THE ENTIRE LINEUP.

**There's More to the Story** Ask for the interesting engineering paper "Continuity of Service at Distribution Voltages by Means of Ring Bus." Contact your nearby A-C office or Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4752

# ALLIS-CHALMERS

## Ford Stock Sale

(*Continued from page* 142)

Whether these "guesstimates" are right or wrong does not change one factor. For the next six months electric utilities should watch the market carefully. What is going to happen can only be guessed. But a wrong guess might prove expensive.

## Bowling Green, Ky., Reduces Electric Rates

Bowling Green, Ky., will lower its electric rates on Jan. 1, giving this city the lowest electric rates in the state of Kentucky.

The Electric Plant Board said the across-the-board rate slash will save the board's 8,850 consumers an estimated $66,500 a year.

Residential users will save 12% a month; commercial consumers, 10%, and industrial power users, 8%. Street lighting charges will drop 3%.

Bowling Green is the 51st of the 148 distributors of Tennessee Valley Authority generated electricity to lower rates, and is the seventeenth system in the TVA area to drop its rates to the lowest rate schedules available for TVA power distributors.

The city's last electric rate cut was Dec. 1, 1947.

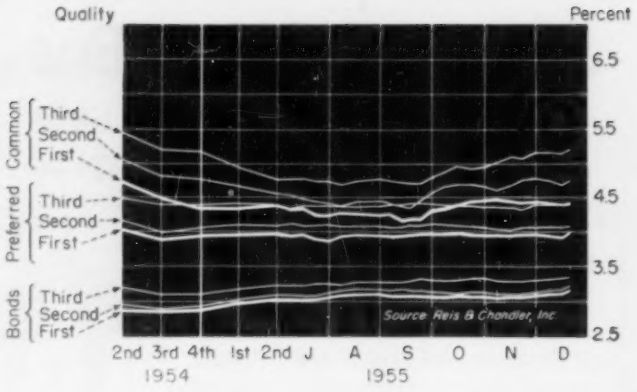
New residential rates are: First 100 kwhr a month, 2¢ a kwhr; next 250 kwhr, 1¢ kwhr; next 700 kwhr, four-tenths of a cent a kwhr, and all over 1,050 kwhr, seven-tenths of a cent a kwhr.

## FINANCIAL BRIEFS

**By an almost 8 to 1 margin** voters in the Sacramento Municipal Utility District approved an $85 million revenue bond issue for the development of a power and water project on the upper American River north of Sacramento, Calif. . . . **Union Electric Co of Missouri** is planning to sell its wholly-owned subsidiary, St. Louis & Belleville Electric Railway Co to Northern Illinois Coal Corp.

**Lansing, Mich., Board of Water & Light** has informed the City Aldermen that the city will have to spend $9 million in the next three years to provide adequate electric service.

## Today's Utility Yields (%)




| | BONDS | | | PREFERRED STOCKS | | | COMMON STOCKS | | |
|---|---|---|---|---|---|---|---|---|---|
| QUALITY | 1st | 2nd | 3rd | 1st | 2nd | 3rd | 1st | 2nd | 3rd |
| Dec. 15 | 3.17 | 3.21 | 3.33 | 4.00 | 4.07 | 4.40 | 4.42 | 4.74 | 5.20 |
| Dec. 8 | 3.11 | 3.15 | 3.31 | 3.97 | 4.06 | 4.38 | 4.39 | 4.70 | 5.13 |

## Utility Earnings

| COMPANY | PERIOD MONTHS | ENDED | NET INCOME 1955 | NET INCOME 1954 | EARNINGS PER COMMON SHARE 1955 | EARNINGS PER COMMON SHARE 1954 |
|---|---|---|---|---|---|---|
| Central Illinois Public Service | 12 | Sept. | $8,610,695 | $7,077,560 | $2.29 | $1.83 |
| Mississippi Power & Light | 12 | Oct. | 4,089,191 | 4,055,295 | ... | ... |
| Montana Power and subsidiaries | 12 | Oct. | 8,465,575 | 7,565,678 | 2.92 | 2.61 |
| Puget Sound Power & Light | 12 | Oct. | 4,870,371 | 4,274,566 | 1.49 | 1.31 |
| Seattle Department of Light | 12 | Sept. | 5,296,874 | 5,630,325 | ... | ... |
| Tampa Electric | 12 | Oct. | 3,304,217 | 2,851,128 | 1.34 | 1.32(a) |

Notes—(a) Based on 2,152,875 shares in 1955 and 1,975,323 shares in 1954.

## Utility Financing

| COMPANY AND DESCRIPTION | AMOUNT OF OFFERING (000) | OFFERING PRICE | YIELD TO PUBLIC |
|---|---|---|---|
| SCHEDULE FOR JANUARY—FEBRUARY | | | |
| BONDS | | | |
| Pennsylvania Electric—1st mtg due 1986 | $21,000(a) | ... | Jan. 17 |
| Dallas Power & Light—1st mtg due 1986 | 10,000 | ... | Feb. 15 |
| Texas Electric Service—1st mtg due 1986 | 10,000 | ... | Feb. 28 |
| PREFERRED STOCK | | | |
| New Orleans Public Service—60,000 sh $100 par | $6,000 | ... | Jan. 11 |
| Pennsylvania Electric | 8,000 | ... | Jan. 17 |
| COMMON STOCK | | | |
| Texas Utilities | $15,000(a) | ... | Jan. 31 |
| Northern States Power | ... | ... | ... |

Note—(a) Estimated.

**Irving Trust Co** has issued a bulletin on the "Underwriters' Compensation for Rights Offerings of Utility Common Stocks." For copy write: John F. Childs, vice president, Irving Trust Co, 1 Wall St., New York, N. Y.

**Harrisonburg, Va., residents** will hold special referendum vote some time in February to decide whether to sell city's municipal electric system to Virginia Electric & Power Co for $2.8 million.

# STATISTICS

## Here's a Look at the Future Farm Market for Electrical Equipment

(Millions of Dollars)

| Major Equipment | 1956-1960 Purchases | | | 1961-1965 Purchases | | | 1966-1970 Purchases | | | 1971-1975 Purchases | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Initial | Replacement | Total | Initial | Replacement | Total | Initial | Replacement | Total | Initial | Replacement | Total |
| Air conditioners | 81 | 21 | 102 | 79 | 66 | 145 | 75 | 92 | 167 | 75 | 117 | 192 |
| Brooders, chick | 4 | 12 | 16 | 4 | 13 | 17 | 3 | 14 | 17 | 2 | 15 | 17 |
| Drill presses | 18 | 15 | 33 | 18 | 18 | 36 | 15 | 21 | 36 | 15 | 24 | 39 |
| Feed grinders | 5 | 14 | 19 | 5 | 15 | 20 | 4 | 17 | 21 | 4 | 18 | 22 |
| Heating, primary | 17 | 3 | 20 | 17 | 9 | 26 | 24 | 16 | 40 | 24 | 24 | 48 |
| Heating, supplemental | 3 | 10 | 13 | 3 | 11 | 14 | 3 | 12 | 15 | 3 | 13 | 16 |
| Livestock watering | 8 | 18 | 26 | 8 | 19 | 27 | 6 | 21 | 27 | 6 | 22 | 28 |
| Milk coolers | 27 | 97 | 124 | 27 | 113 | 140 | 23 | 125 | 148 | 23 | 137 | 160 |
| Milking machines | 23 | 54 | 77 | 23 | 60 | 83 | 19 | 65 | 84 | 19 | 69 | 88 |
| Motors, fractional HP | 12 | 17 | 29 | 12 | 20 | 32 | 11 | 23 | 34 | 11 | 25 | 36 |
| Power saws | 12 | 9 | 21 | 11 | 12 | 23 | 11 | 13 | 24 | 11 | 15 | 26 |
| Tool grinders | 7 | 8 | 15 | 7 | 10 | 17 | 7 | 11 | 18 | 7 | 13 | 20 |
| Water heaters, dairy | 8 | 2 | 10 | 8 | 6 | 14 | 9 | 9 | 18 | 9 | 12 | 21 |
| Water pumps | 26 | 98 | 124 | 26 | 104 | 130 | 26 | 109 | 135 | 26 | 114 | 140 |
| Lights & Wiring, house | 441 | 575 | 1,016 | 435 | 679 | 1,114 | 375 | 764 | 1,139 | 375 | 843 | 1,218 |
| Others (Includes freezers, washers, TVs) | 924 | 2,377 | 3,301 | 910 | 2,880 | 3,790 | 641 | 3,181 | 3,822 | 642 | 3,418 | 4,060 |
| Total | 1,616 | 3,330 | 4,946 | 1,593 | 4,035 | 5,628 | 1,252 | 4,493 | 5,745 | 1,252 | 4,879 | 6,131 |

Source: Rural Electrification Administration

## Power Statistics . . .

| | | Latest Month | Preceding Month | Year Ago | Annual Change % |
|---|---|---|---|---|---|
| Capacity | Oct. | 112.13 | 110.91 | 100.01 | 12.1 |
| Peak—Class I Systems — million kw | Sept. | 90.1 | 91.6 | 79.5 | 13.3 |
| Estimated Dec. '55 Peak | Sept. | 96.82 | 96.54 | 96.21 | 0.6 |
| Production—billion kwhr | Oct. | 47.37 | 46.33 | 40.46 | 17.1 |
| Hydro | | 8.77 | 8.17 | 7.83 | 12.0 |
| Fuel | | 38.60 | 38.18 | 32.63 | 18.3 |
| Sales—billion kwhr | Aug. | 43.44 | 40.89 | 36.28 | 19.7 |
| Residential | | 10.46 | 9.89 | 9.30 | 12.5 |
| Commercial | | 7.39 | 6.92 | 6.56 | 12.7 |
| Industrial | | 22.84 | 21.50 | 17.80 | 28.3 |
| Other | | 2.74 | 2.59 | 2.62 | 4.6 |
| Fuel Consumption | Oct. | | | | |
| Coal—million tons | | 12.66 | 12.07 | 10.34 | 22.4 |
| Oil—million barrels | | 6.04 | 5.18 | 5.32 | 13.5 |
| Gas—billion cu ft | | 104.75 | 120.17 | 108.60 | −3.5 |
| Net Income Class A & B Co's—$ million | Sept. | 100.23 | 93.95 | 92.26 | 8.6 |
| Residential Customers—millions | 12 mos. | 44.10 | 43.96 | 42.82 | 3.0 |
| Revenue per kwhr | ended | 2.66¢ | 2.66¢ | 2.70¢ | −1.5 |
| Avg kwhr per customer | Sept. 30 | 2,698 | 2,682 | 2,497 | 8.0 |
| Avg. annual bill | | $71.77 | $71.34 | $67.42 | 6.5 |

## Business Statistics . . .

| | | | | | |
|---|---|---|---|---|---|
| Indexes: 1947-49 = 100 | | | | | |
| FRB Industrial Production | Nov. | 144 | 143 | 128 | 12.5 |
| ENR Construction Cost | Oct. | 141.2 | 141.0 | 134.6 | 4.9 |
| BLS Cost-of-living | Oct. | 114.9 | 114.9 | 114.5 | 0.3 |
| NEMA Sales | Oct. | | | | |
| Insulation materials | | 156 | 156 | 117 | 33.3 |
| Electric appliances | | 118 | 131 | 102 | 15.7 |
| Household refrigerators | | 64 | 85 | 51 | 25.5 |
| Wholesale prices | Oct. | | | | |
| Motors and generators | | 125.3 | 125.1 | 121.8 | 2.9 |
| Transformers and regulators | | 129.2 | 129.2 | 128.1 | 0.9 |
| Switchgear and fuses | | 146.3 | 146.1 | 135.1 | 8.3 |
| GNP—annual rate—$ billion | 3rd Qtr. | 392.0 | 384.8 | 358.8 | 9.3 |

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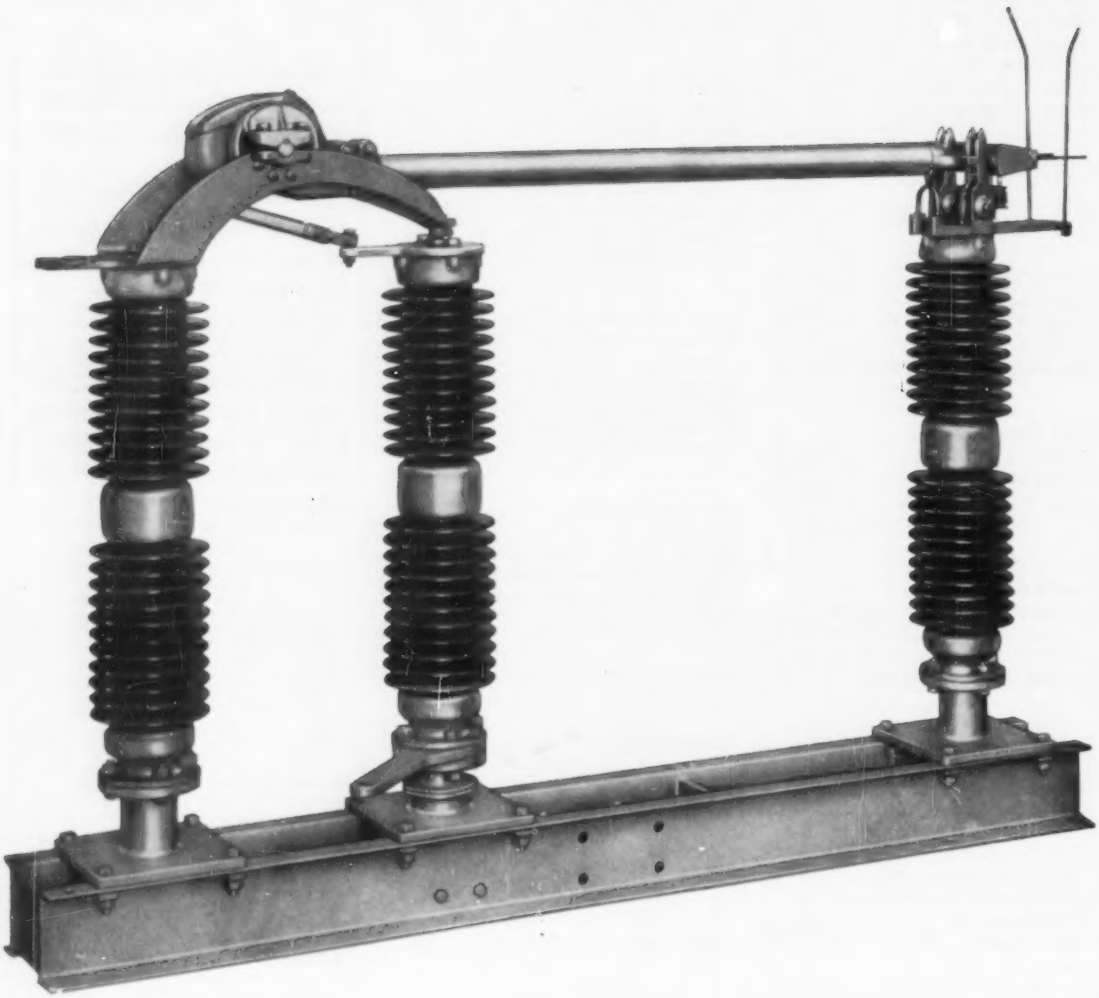

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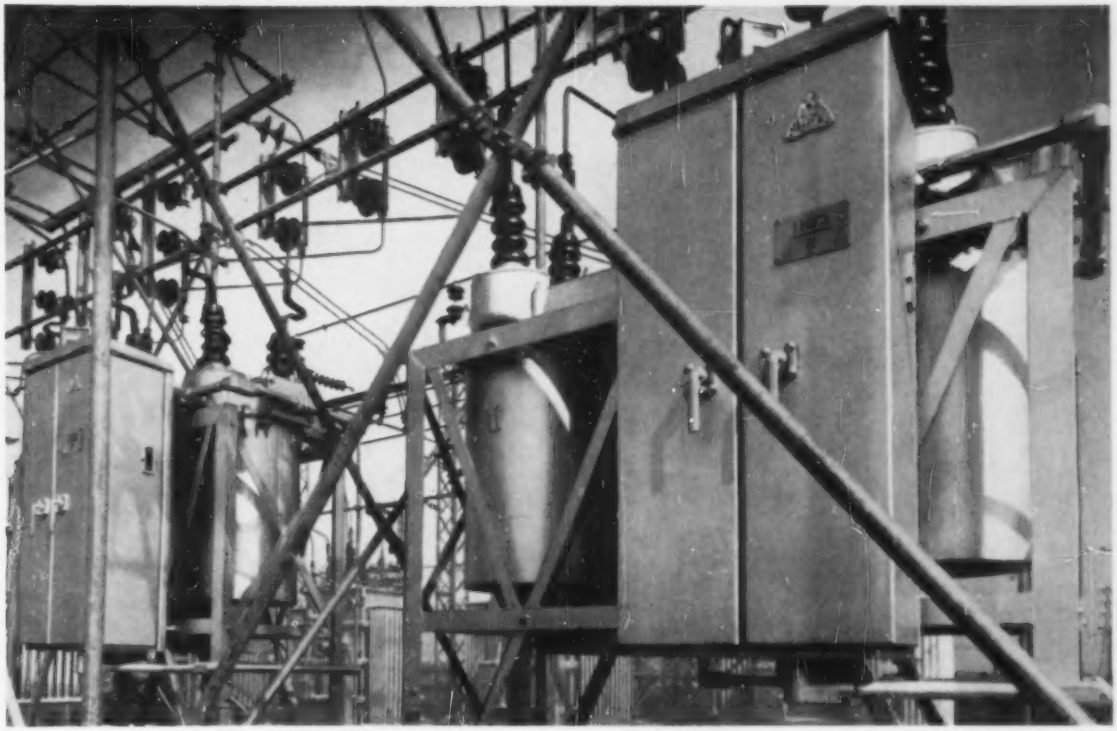

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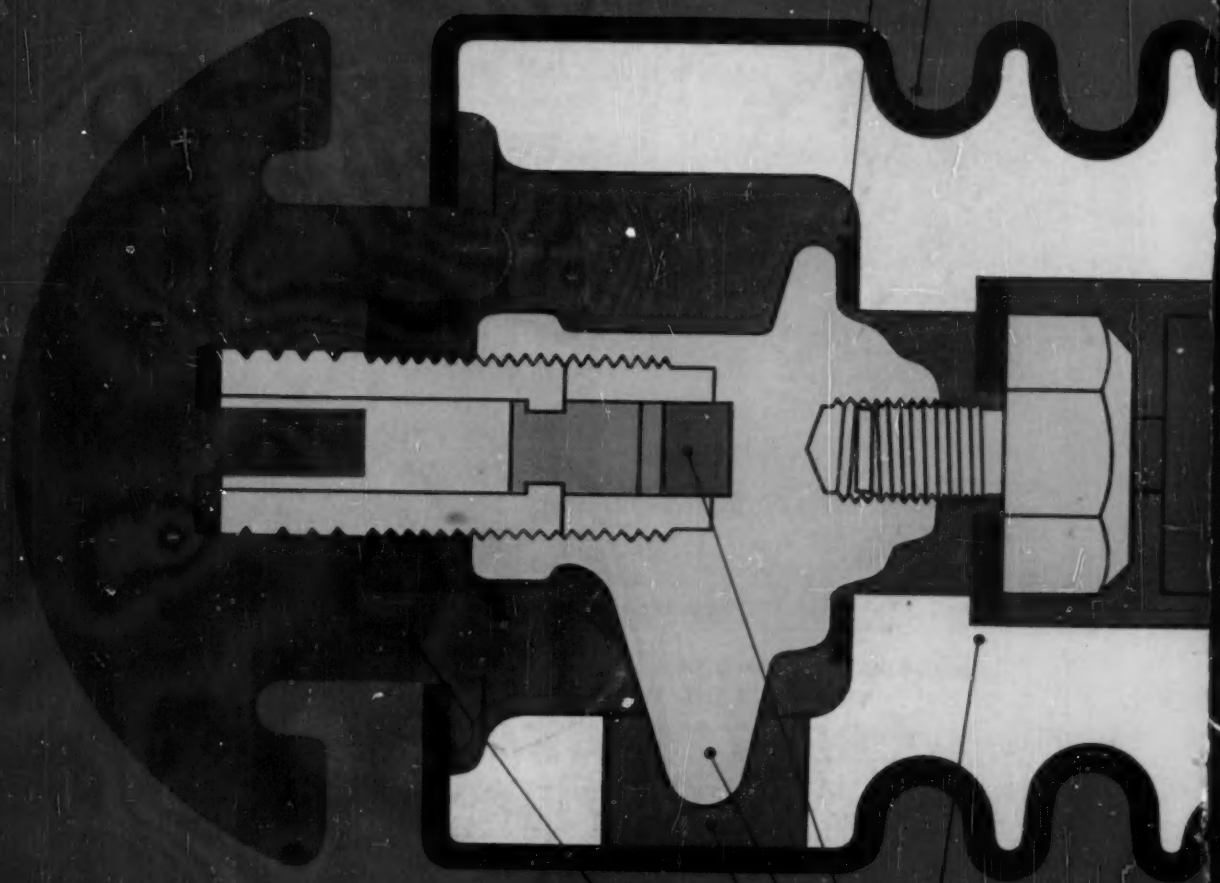

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